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DEPARTMENT OF FISH AND GAME

SOUTHERN CALIFORNIA PARTYBOAT SAMPLING STUDY
QUARTERLY REPORT NO. 10

by

Stephen J. Crooke

MARINE RESOURCES

Administrative Report No. 78-11

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ABSTRACT

Between October 1 and December 31, 1977, Departmental personnel sampled catches during 166 trips aboard commercial passenger fishing vessels operating in southern California. A total of 27,468 fishes belonging to 101 species were identified and measured. Otoliths for age determination studies were removed from 263 rockfish carcasses representing 27 species. In addition, 37 long-range trips originating in San Diego and fishing in Mexican waters were sampled. A total of 7,204 fishes comprising 20 species was identified and measured at dockside from these vessels.

The 10 most commonly taken species during the quarter accounted for 74.3% of the southern California catch. The most frequently sampled species were chilipepper, *Sebastes goodei* (16.1%); Pacific mackerel, *Scomber japonicus* (15.4%); bocaccio, *Sebastes paucispinis* (10.1%); kelp bass, *Paralabrax clathratus* (7.8%); halfmoon, *Medialuna californiensis* (5.7%); olive rockfish, *Sebastes serranoides* (5.4%); blue rockfish, *S. mystinus* (4.4%); greenspotted rockfish, *S. chlorostictus* (3.4%); vermilion rockfish, *S. miniatus* (3.2%); and Pacific bonito, *Sarda chiliensis* (2.7%). Data gathered from long-range trips showed the top five species accounted for 88.8% of the fish sampled. The most frequently sampled species were yellowtail, *Seriola dorsalis* (31.0%); yellowfin tuna, *Thunnus albacares* (23.7%); dolphinfish, *Coryphaena hippurus* (18.6%); wahoo, *Acanthocybium solanderi* (10.0%); and snowy grouper, *Epinephelus niveatus* (5.6%).

Partyboat sampling was expanded to include long-range vessels operating from San Diego.

[1] Marine Resources Agministrative Report No. 78-11, September 1978. This study is being performed as part of Dingell-Johnson Project California F-35-P, "Southern California Marine Sportfish Research" supported by Federal aid to Fish Restoration Funds. Field work was conducted in cooperation with the Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, under a contract entitled Collection and Compilation of Southern California Partyboat Fishery Statistics, Project 868.

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INTRODUCTION

Between October 1 and December 31, 1977, Departmental personnel sampled catches during 166 trips aboard commercial passenger fishing vessels operating in southern California. A total of 27,468 fishes belonging to 101 species were identified and measured.[3/] Otoliths for age determination studies were removed from 263 rockfish carcasses representing 27 species. In addition, 37 long-range trips originating in San Diego and fishing in Mexican waters were sampled. A total of 7,204 fishes comprising 20 species was identified and measured at dockside from these vessels.

The 10 most commonly taken species during the quarter accounted for 74.3% of the southern California catch (Table 1). The most frequently sampled species were chilipepper, *Sebastes goodei* (16.1%); Pacific mackerel, *Scomber japonicus* (15.4%); bocaccio, *Sebastes paucispinis* (10.1%); kelp bass, *Paralabrax clathratus* (7.8%); halfmoon, *Medialuna californiensis* (5.7%); olive rockfish, *Sebastes serranoides* (5.4%); blue rockfish, *S. mystinus* (4.4%); greenspotted rockfish, *S. chlorostictus* (3.4%); vermilion rockfish, *S. miniatus* (3.2%); and Pacific bonito, *Sarda chiliensis* (2.7%). Data gathered from long-range trips showed the top five species accounted for 88.8% of the fish sampled (Table 2). The most frequently sampled species were yellowtail, *Seriola dorsalis* (31.0%); yellowfin tuna, *Thunnus albacares* (23.7%); dolphinfish, *Coryphaena hippurus* (18.6%); wahoo, *Acanthocybium solanderi* (10.0%);

3/ For definition of length measurements see Maxwell and Schultze, Administrative Report 76-3.

and snowy grouper, *Epinephelus niveatus* (5.6%).

OPERATIONS

Partyboat sampling was expanded during October to include long-range vessels operating from San Diego. Boats in this category ran trips of from 5 to 21 days duration and often ranged as far south as the Revilla Gigedo Islands (950 miles). Sampling was conducted at dockside after the vessels had returned. We identified all fishes taken and measuring 30-40% of each species landed. Throughout the fall, 50% of the trips were sampled.

ROCKFISHES

During the quarter 15,343 rockfish representing 40 species were identified (Table 3). This group accounted for 55.8% of the sampled catch. Last quarter rockfishes (*Sebastes* spp.) accounted for 36.6% of the catch while during the same quarter in 1977 they accounted for 80.9%. The marked decline in the importance of rockfishes from last year can be attributed to increased availability of surface species during the fall months. The top 10 species comprised 85% of the sampled catch, a decline of 5% from last quarter and the same quarter a year ago.

Chilipepper was the most abundant rockfish, accounting for 28.9% of the fishes measured. This was a gain of 9.0% from the same quarter last year (1976 = 19.8%) and a dramatic increase from last quarter when they accounted for only 0.1% of the catch. The average length of chilipepper (Figures 1-3) for the quarter remained constant ($\bar{x}$ length = 37.3 cm) when compared with the same quarter last year ($\bar{x}$ length = 37.4 cm). No data on chilipepper are available from the previous quarter for comparison. Bocaccio (Figures 4-6), with an average length of 46.2 cm, showed a marked increase in size from those taken the previous quarter

($\bar{x}$ length = 40.6 cm). Additionally, they were 3.5 longer than those taken during the same quarter last year (1976 $\bar{x}$ length = 29.6 cm). Olive rockfish averaged 28.4 cm in length (Figures 7-9). This represents a decline of 1.2 cm in length from last quarter ($\bar{x}$ length = 29.6 cm) and an increase in length of 2.2 cm from the same quarter in 1976 ($\bar{x}$ length = 20.6 cm). The length of blue rockfish (Figures 10-12) dropped from 27.7 cm the previous quarter to 24.8 cm this quarter. Conversely, from the same quarter last year, we see that this quarter's fish are 0.9 cm bigger (1976 $\bar{x}$ length = 23.9 cm).

SURFACE GAMEFISHES

The top four species of surface fishes accounted for 31.7% of all fishes measured. This is down considerably from last quarter (50.0%) but represents a 185% increase over the 4th quarter of 1976. Warm water conditions persisted off southern California throughout the quarter and were probably responsible for the high catch rates.

Pacific mackerel catches continued to be dominated by two year classes (Figures 13-15). The 1976 year class was represented by a strong mode at 31.0 cm while the 1974 year class appeared as a mode at 39.0 cm. During October, the 1977 year class was easily observed as a mode at 25 cm. The average length of 33.0 cm for kelp bass dropped 1.3 cm from the previous quarter's average length of 34.3 cm (Figures 16-18). No data were available for a comparable period last year. Data on half-moon show a slight decline in size during the quarter (Figures 19-21) but the average length was 29.7 cm. Pacific bonito catches were dominated by the 1976 year class during October and November (Figures 22-23). However, in December the 1977 year class appeared in large enough numbers to account for one-half of the fish sampled (Figure 24).

California barracuda continued to show indications of recovery as the 1973 and 1974 year classes, with modes at 67 cm and 62 cm, contributed heavily to the catch (Figures 25-27).

LONG-RANGE FISHES

Yellowtail (Figures 28-30) taken in Mexican waters averaged 77.5 cm fork length, which is equivalent to an average weight of 5.8 kg (12.8 pounds). When comparing yellowfin tuna catches it is evident that catches in October and November were dominated by 55-60 cm fish while in December, fish at 85 cm also contributed significantly (Figures 31-33). Wahoo were spread over a wide range of sizes with the mean length at 130.4 cm (Figures 34-36). During October, dolphinfish exhibited a bimodal distribution with peaks at 70 cm and 90 cm in length (Figures 37-39). By November, and on through December, only the 70 cm mode was present. Giant sea bass were distributed over a large range of sizes with the mean length at 125.0 cm for the quarter (Figures 40-42).

EFFORT AND CATCH-PER-UNIT-EFFORT

Fishing effort (average number of anglers per trip) for October was lower than for the same month last year (Table 4). During November, it increased and by December it had declined again. However, during both months it still remained above last year's figures. Catch-per-unit-of-effort was up 22% when comparing October of 1977 with the same month in 1976. During November it dropped 22% and in December it dropped 7% when compared to the corresponding months last year.

No long-range information on fishing effort or CPUE was available because we had no observers on the vessels. Attempts to develop a simple CPUE figure would be difficult because of the large amount of time spent in transit and the great variability in trip length.

TABLE 1. Number of Fishes Measured from Southern California Partyboats, October through December 1977.

Common name	Scientific name	Number measured	Common name	Scientific name	Number measured
Surfperch, barred	*Amphistichus argenteus*	2	Rockfish, greenspotted	*Sebastes chlorostictus*	945
Eel, wolf	*Anarrhichthys ocellatus*	1	Rockfish, black & yellow	*S. chrysomelas*	18
Sablefish	*Anoplopoma fimbria*	30	Rockfish, starry	*S. constellatus*	279
Topsmelt	*Atherinops affinis*	2	Rockfish, calico	*S. dallii*	56
Jacksmelt	*Atherinopsis californiensis*	12	Rockfish, greenstriped	*S. elongatus*	313
Seabass, white	*Atractoscion nobilis*	41	Rockfish, swordspine	*S. ensifer*	63
Mackerel, frigate	*Auxis thazard*	14	Rockfish, widow	*S. entomelas*	212
Whitefish, ocean	*Caulolatilus princeps*	437	Rockfish, pink	*S. eos*	163
Shark, swell	*Cephaloscyllium ventriosum*	1	Rockfish, yellowtail	*S. flavidus*	71
Croaker, black	*Cheilotrema saturnum*	11	Rockfish, bronzespotted	*S. gilli*	15
Blacksmith	*Chromis punctipinnis*	15	Chilipepper	*S. goodei*	4416
Sanddab, Pacific	*Citharichthys sordidus*	141	Rockfish, rosethorn	*S. helvomaculatus*	13
Sanddab, speckled	*C. stigmaeus*	2	Rockfish, squarespot	*S. hopkinsi*	495
Surfperch, black	*Embiotoca jacksoni*	2	Rockfish, shortbelly	*S. jordani*	12
Sole, petrale	*Eopsetta jordani*	29	Cowcod	*S. levis*	65
Skipjack	*Euthynnus pelamis*	7	Rockfish, Mexican	*S. macdonaldi*	144
Croaker, white	*Genyonemus lineatus*	392	Rockfish, vermilion	*S. miniatus*	887
Opaleye	*Girella nigricans*	86	Rockfish, blue	*S. mystinus*	1207
Wrasse, rock	*Halichoeres semicinctus*	2	Rockfish, speckled	*S. ovalis*	218
Kelpfish, giant	*Heterostichus rostratus*	11	Bocaccio	*S. paucispinis*	2766
Greenling, rock	*Hexagrammos superciliosus*	2	Rockfish, chameleon	*S. phillipsi*	2
Sole, bigmouth	*Hippoglossina stomata*	4	Rockfish, canary	*S. pinniger*	11
Ratfish	*Hydrolagus colliei*	6	Rockfish, redstripe	*S. proriger*	1
Shark, bonito	*Isurus oxyrinchus*	3	Rockfish, grass	*S. rastrelliger*	33
Sole, rock	*Lepidopsetta bilineata*	1	Rockfish, rosy	*S. rosaceus*	165
Halfmoon	*Medialuna californiensis*	1578	Rockfish, greenblotched	*S. rosenblatti*	137
Hake, Pacific	*Merluccius productus*	84	Rockfish, yelloweye	*S. ruberrimus*	7
Mola, common	*Mola mola*	1	Rockfish, flag	*S. rubrivinctus*	252
Smoothhound, gray	*Mustelus californicus*	3	Rockfish, bank	*S. rufus*	221
Smoothhound, brown	*M. henlei*	13	Rockfish, stripetail	*S. saxicola*	7
Lingcod	*Ophiodon elongatus*	37	Rockfish, halfbanded	*S. semicinctus*	44
Senorita	*Oxyjulis californica*	17	Rockfish, olive	*S. serranoides*	1494
Bass, kelp	*Paralabrax clathratus*	2164	Treefish	*S. serriceps*	55
Bass, barred sand	*P. nebulifer*	641	Rockfish, pinkrose	*S. simulator*	21
Halibut, California	*Paralichthys californicus*	174	Rockfish, honeycomb	*S. umbrosus*	182
Sole, English	*Parophrys vetulus*	1	Rockfish, sharpchin	*S. zacentrus*	2
Sheephead, California	*Pimelometopon pulchrum*	193	Yellowtail	*Seriola dorsalis*	42
Turbot, C-O	*Pleuronichthys coenosus*	1	Queenfish	*Seriphus politus*	79
Shark, blue	*Prionace glauca*	5	Barracuda, California	*Sphyraena argentea*	252
Sole, sand	*Psettichthys melanostictus*	1	Dogfish, spiny	*Squalus acanthias*	59
Surfperch, rubberlip	*Rhacochilus toxotes*	1	Needlefish, California	*Strongylura exilis*	5
Guitarfish, shovelnose	*Rhinobatos productus*	7	Lizardfish, California	*Synodus lucioceps*	48
Bonito, Pacific	*Sarda chiliensis*	755	Tuna, yellowfin	*Thunnus albacares*	1
Sardine, Pacific	*Sardinops sagax caeruleus*	1	Tuna, bluefin	*T. thynnus*	25
Mackerel, Pacific	*Scomber japonicus*	4218	Mackerel, jack	*Trachurus symmetricus*	216
Sculpin	*Scorpaena guttata*	216	Shark, leopard	*Triakis semifasciata*	1
Cabezon	*Scorpaenichthys marmoratus*	23	Croaker, yellowfin	*Umbrina roncador*	7
Rockfish, kelp	*Sebastes atrovirens*	45	Poacher, bluespotted	*Xeneretmus triacanthus*	1
Rockfish, brown	*S. auriculatus*	88	Sole, fantail	*Xystreurys liolepis*	1
Rockfish, gopher	*S. carnatus*	59	Surfperch, pink	*Zalembius rosaceus*	1
Rockfish, copper	*S. caurinus*	159	TOTAL		27,468

TABLE 2. Number of Fishes Measured from Long-Range Partyboats, October through December 1977.

Common name	Scientific name	Number measured	Common name	Scientific name	Number measured
Wahoo	*Acanthocybium solanderi*	717	Grouper, leopard	*Mycteroperca rosacea*	20
Seabass, white	*Atractoscion nobilis*	3	Grouper, broomtail	*M. prionura*	21
Jack, black	*Caranx lugubris*	38	Grouper, spotted broomtail	*M. xenarcha*	12
Dolphinfish	*Coryphaena hippurus*	1337	Halibut, California	*Paralichthys californicus*	1
Runner, rainbow	*Elagatis bipinnulata*	46	Amberjack, Pacific	*Seriola colburni*	10
Cabrilla, spotted	*Epinephelus analogus*	119	Yellowtail	*S. dorsalis*	2234
Bass, leather	*E. dermatolepis*	4	Sea bass, giant	*Stereolepis gigas*	135
Grouper, snowy*	*E. niveatus*	404	Albacore	*Thunnus alalunga*	1
Skipjack, black	*Euthynnus lineatus*	4	Tuna, yellowfin	*T. albacares*	1704
Skipjack	*E. pelamis*	66			
Snapper	*Lutjanus peru*	328	TOTAL		7,204

*May include a few gulf groupers (*Mycteroperca jordani*) that were misidentified.

TABLE 3. Species Composition of Rockfishes (*Sebastes* spp.) Catch from Partyboat Samples, October through December 1977.

Common name	Scientific name	Frequency of Occurrence (%)
Chilipepper	*Sebastes goodei*	28.8
Bocaccio	*S. paucispinis*	18.0
Olive	*S. serranoides*	9.7
Blue	*S. mystinus*	7.9
Greenspotted	*S. chlorostictus*	6.2
Vermilion	*S. miniatus*	5.8
Squarespot	*S. hopkinsi*	3.2
Greenstripe	*S. elongatus*	2.0
Starry	*S. constellatus*	1.8
Flag	*S. rubrivinctus*	1.6
Bank	*S. melanops*	1.4
Speckled	*S. ovalis*	1.4
Widow	*S. entomelas*	1.4
Honeycomb	*S. umbrosus*	1.2
Rosy	*S. rosaceus*	1.1
Pink	*S. eos*	1.1
Copper	*S. caurinus*	1.0
Mexican	*S. macdonaldi*	1.0
Greenblotched	*S. rosenblatti*	0.9
Brown	*S. auriculatus*	0.6
Yellowtail	*S. flavidus*	0.5
Cowcod	*S. levis*	0.4
Swordspine	*S. ensifer*	0.4
Gopher	*S. carnatus*	0.4
Calico	*S. dallii*	0.4
Treefish	*S. serriceps*	0.4
Kelp	*S. atrovirens*	0.3
Halfbanded	*S. semicinctus*	0.3
Grass	*S. rastrelliger*	0.2
Pinkrose	*S. simulator*	0.1
Black & yellow	*S. chrysomelas*	0.1
Bronzespotted	*S. gilli*	<0.1
Rosethorn	*S. helvomaculatus*	<0.1
Shortbelly	*S. jordani*	<0.1
Canary	*S. pinniger*	<0.1
Yelloweye	*S. ruberrimus*	<0.1
Stripetail	*S. saxicola*	<0.1
Chameleon	*S. phillipsi*	<0.1
Sharpchin	*S. zacentrus*	<0.1
Redstripe	*S. proriger*	<0.1

TABLE 4. Effort and Catch per-Unit-Effort Values Determined from Partyboat Samples for Each Port Complex and Month, January 1976 through December 1977.

1976

	Port complex	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No. trips/month													
	1	7	8	8	10	10	11	0	4	12	8	14	11
	2	7	5	7	7	10	9	5	7	5	2	4	6
	3	3	2	2	2	3	4	3	2	2	4	6	4
	4	7	5	6	9	10	8	13	9	8	9	7	8
	5	11	16	12	11	9	8	12	13	6	7	14	12
	6	10	11	12	9	9	8	10	16	10	13	15	15
TOTAL		45	47	47	48	51	48	43	51	43	43	60	56
Avg. no. anglers/trip													
	1	29.71	19.25	28.63	20.50	48.10	44.55	-	46.00	28.66	23.88	15.64	18.30
	2	26.57	23.00	20.57	21.57	30.20	36.89	51.20	45.71	29.60	21.50	18.50	19.70
	3	22.33	22.00	11.50	23.00	21.67	45.50	44.33	36.50	38.50	19.50	33.17	23.30
	4	30.57	29.00	26.17	25.33	26.20	39.38	43.23	49.11	30.75	27.20	25.28	27.50
	5	22.00	23.44	29.58	29.00	31.56	35.38	39.67	39.92	25.83	23.70	24.21	21.90
	6	16.40	25.64	23.83	22.89	26.22	27.13	43.30	38.44	24.00	21.46	18.00	19.60
Average		24.91	23.32	33.38	24.06	31.96	37.90	43.26	42.22	28.14	23.30	21.30	21.50
No. fish caught/angler hour fished													
	1	1.20	1.36	1.20	0.95	1.28	2.07	-	0.40	0.70	1.14	2.45	2.21
	2	1.47	1.16	1.16	0.73	0.92	1.13	0.92	0.44	0.39	1.21	2.09	1.66
	3	1.25	0.50	2.16	1.47	0.67	0.70	0.43	0.55	0.55	0.89	1.61	1.00
	4	1.87	1.77	1.48	1.67	0.80	0.94	0.76	0.80	1.18	2.07	2.19	2.19
	5	3.28	2.77	2.51	1.97	1.47	0.74	0.69	1.05	1.09	1.00	1.66	2.54
	6	3.55	1.80	1.92	1.41	2.33	1.03	0.58	0.87	1.43	1.96	3.19	2.92
Average		2.15	1.69	1.74	1.42	1.23	1.13	0.70	0.77	0.96	1.62	2.24	2.28

1977

	Port complex	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No. trips/month													
	1	1	3	7	10	8	10	12	9	8	9	8	5
	2	6	2	2	2	3	5	9	11	12	7	7	6
	3	4	3	2	2	3	5	5	5	4	5	4	3
	4	7	4	4	7	12	10	11	13	11	12	13	10
	5	10	5	8	7	8	6	9	12	16	13	16	9
	6	14	11	7	10	7	10	10	11	16	14	13	12
TOTAL		42	28	30	38	41	46	56	61	67	60	61	45
Avg. no. anglers/trip													
	1	17.00	56.00	24.00	30.30	18.62	27.70	42.58	50.00	36.87	17.44	23.00	17.60
	2	18.33	32.50	23.00	24.00	19.67	30.40	40.78	40.55	22.00	27.29	21.57	28.67
	3	25.75	27.67	22.00	15.00	27.33	35.20	36.20	32.80	23.50	21.60	32.50	20.00
	4	28.57	32.50	24.00	33.00	31.17	42.80	41.27	29.54	28.27	23.58	35.08	27.90
	5	21.60	36.00	22.87	33.29	17.50	20.50	28.00	24.50	22.75	21.08	18.94	18.00
	6	19.00	30.45	26.14	25.50	23.14	12.30	31.20	41.82	22.75	14.40	18.62	13.50
Average		21.00	34.00	22.00	28.00	23.00	32.00	37.00	36.00	26.00	20.00	24.00	22.00
No. fish caught/angler hour fished													
	1	1.85	1.35	0.89	0.98	1.29	0.98	1.10	0.98	1.30	1.61	2.41	2.82
	2	1.11	0.48	1.77	0.22	0.96	2.18	0.87	1.02	1.13	0.89	1.48	1.45
	3	1.03	0.66	1.86	0.60	1.00	1.20	0.62	1.29	1.06	2.07	1.98	1.33
	4	2.95	2.30	1.19	1.55	1.70	1.60	1.11	1.50	1.58	2.22	1.48	2.77
	5	2.40	0.88	2.30	1.07	0.47	1.00	0.96	1.74	1.70	2.24	1.82	1.78
	6	4.04	1.54	1.11	1.64	1.05	0.59	1.29	1.40	2.36	2.50	2.34	2.05
Average		2.61	1.29	1.44	1.21	1.21	1.25	1.04	1.30	1.63	1.98	1.83	2.13

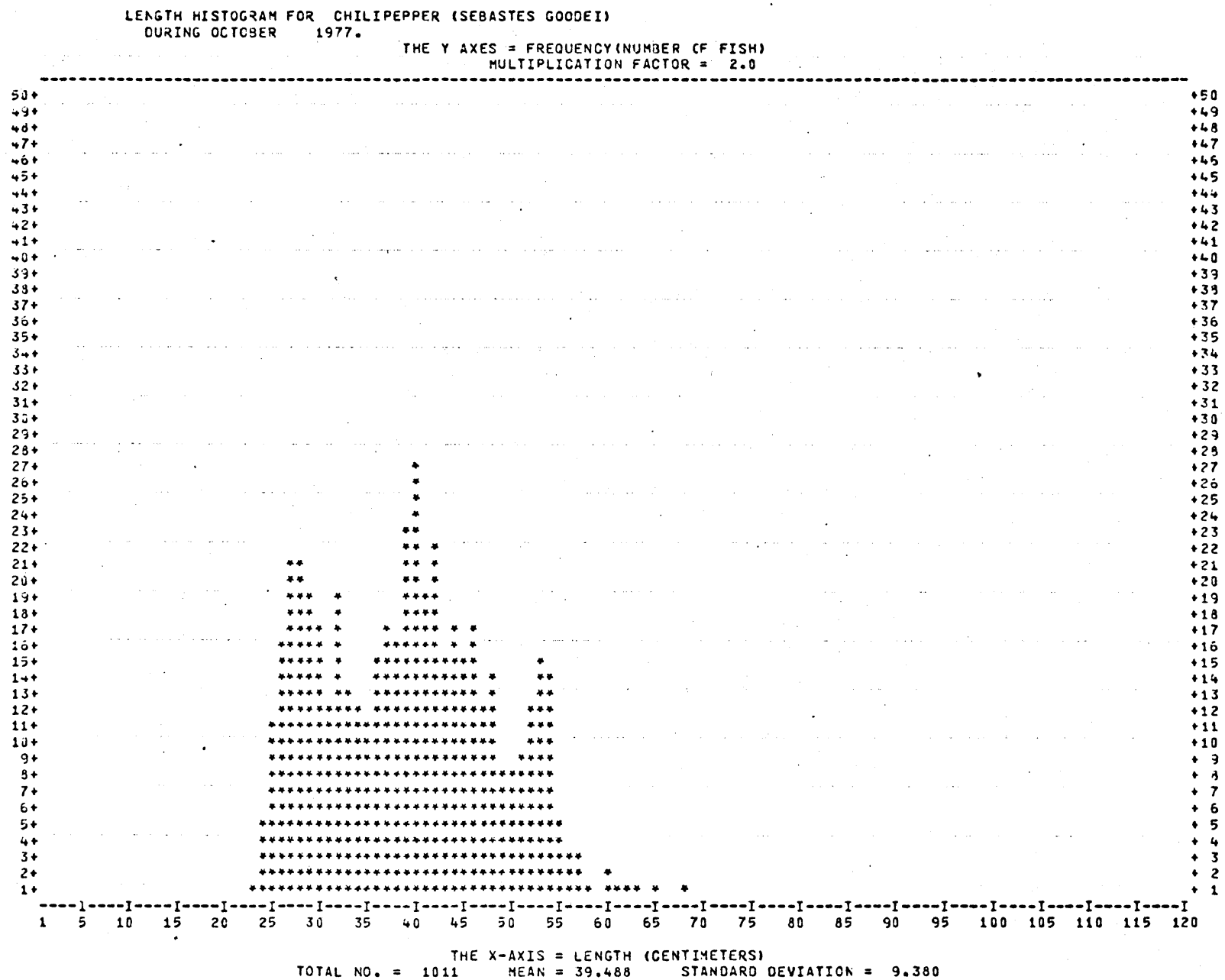


FIGURE 1. Length frequencies of chilipepper for October 1977.

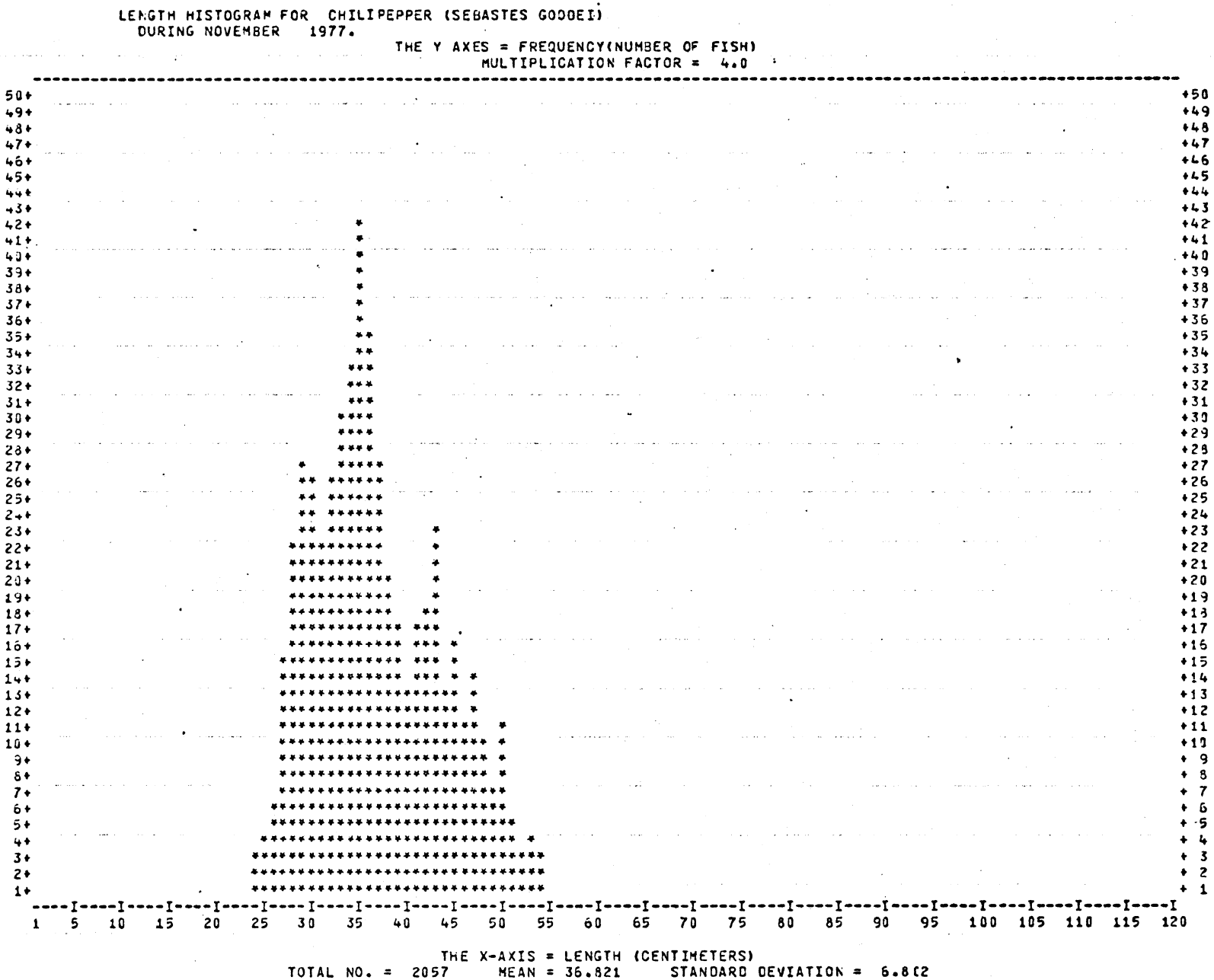


FIGURE 2. Length frequencies of chilipepper for November 1977.

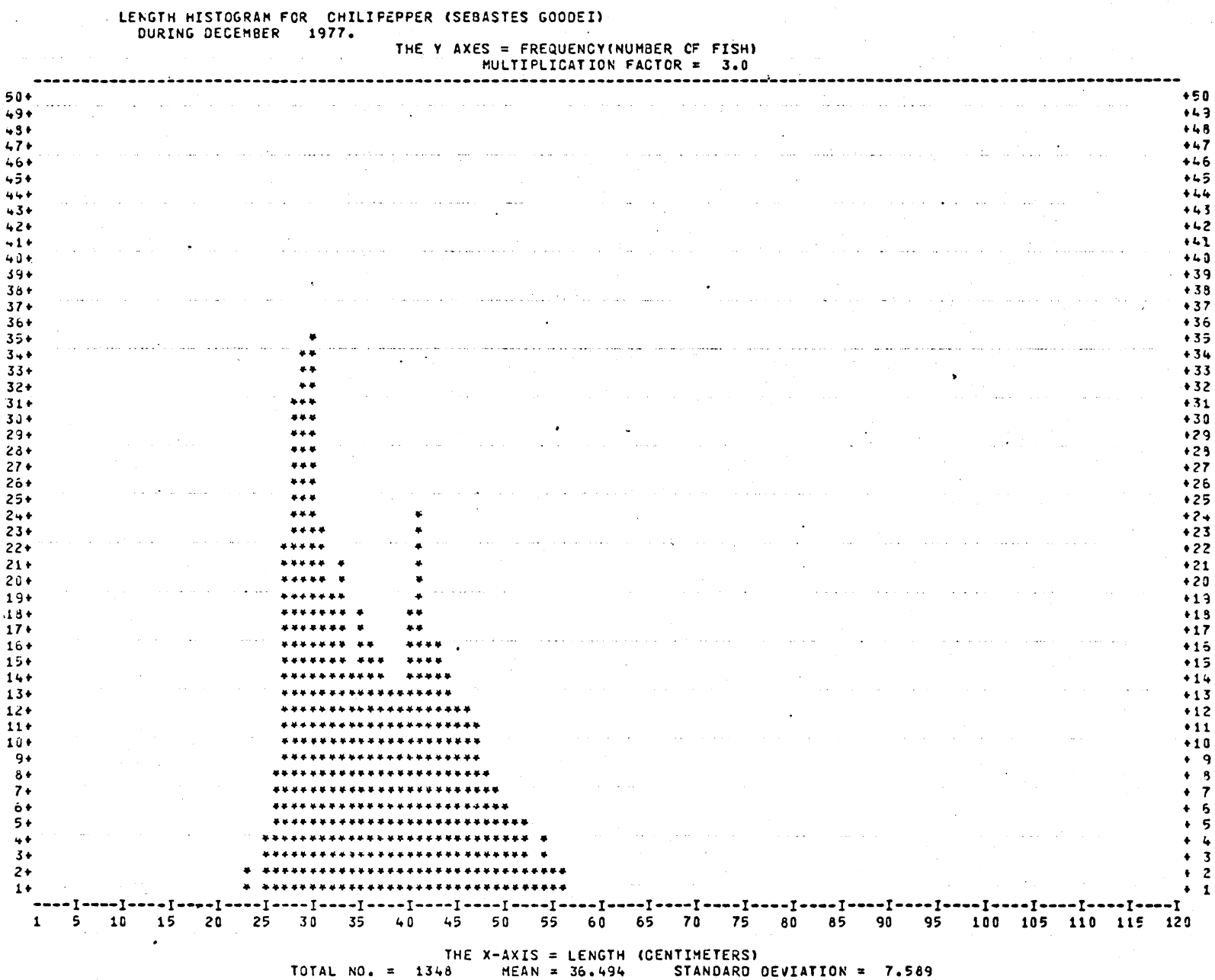


FIGURE 3. Length frequencies of chilipepper for December 1977.
Total No. Quarter 4,416 Mean Length Quarter 37.331 cm

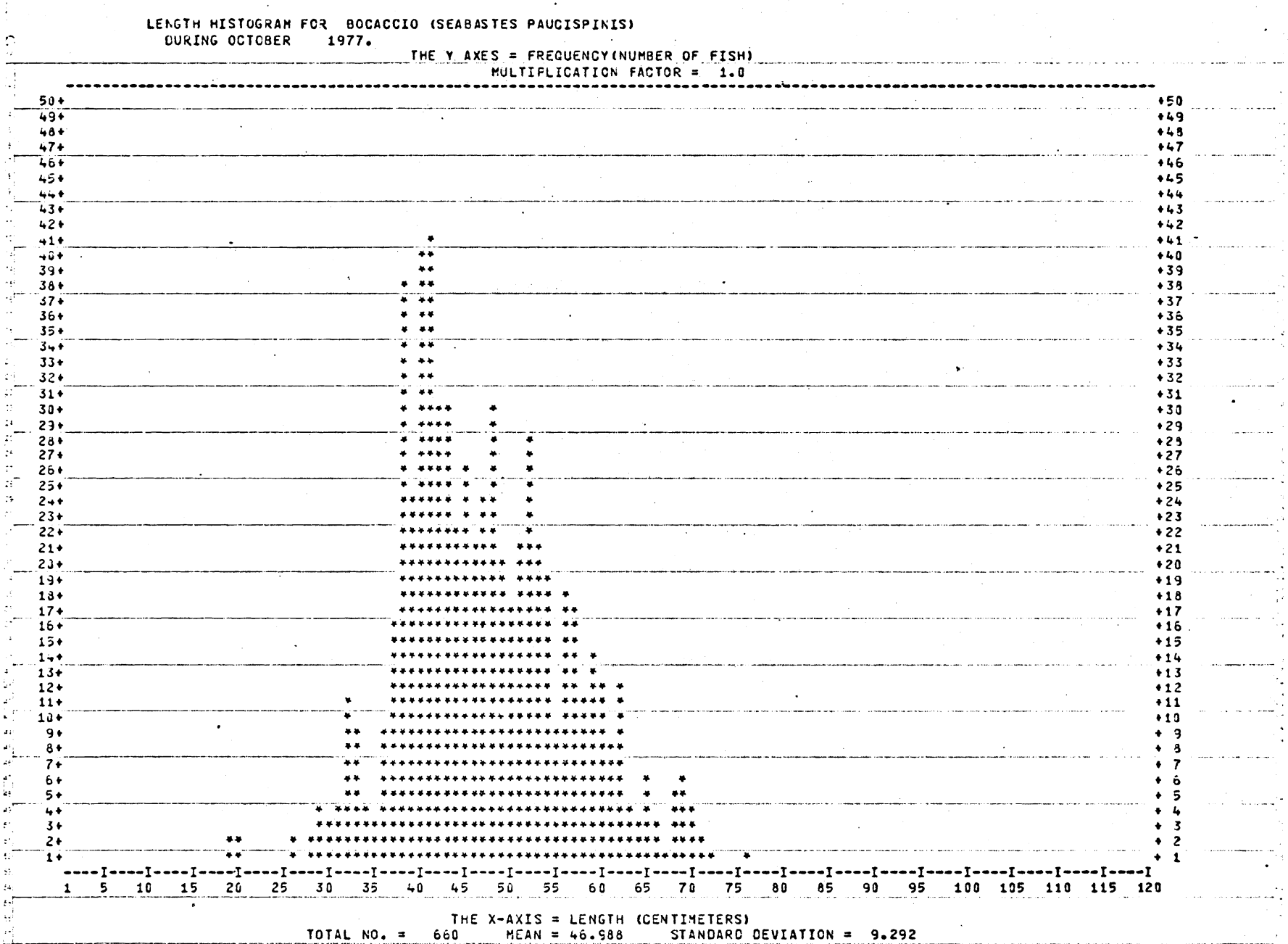


FIGURE 4. Length frequencies of bocaccio for October 1977.

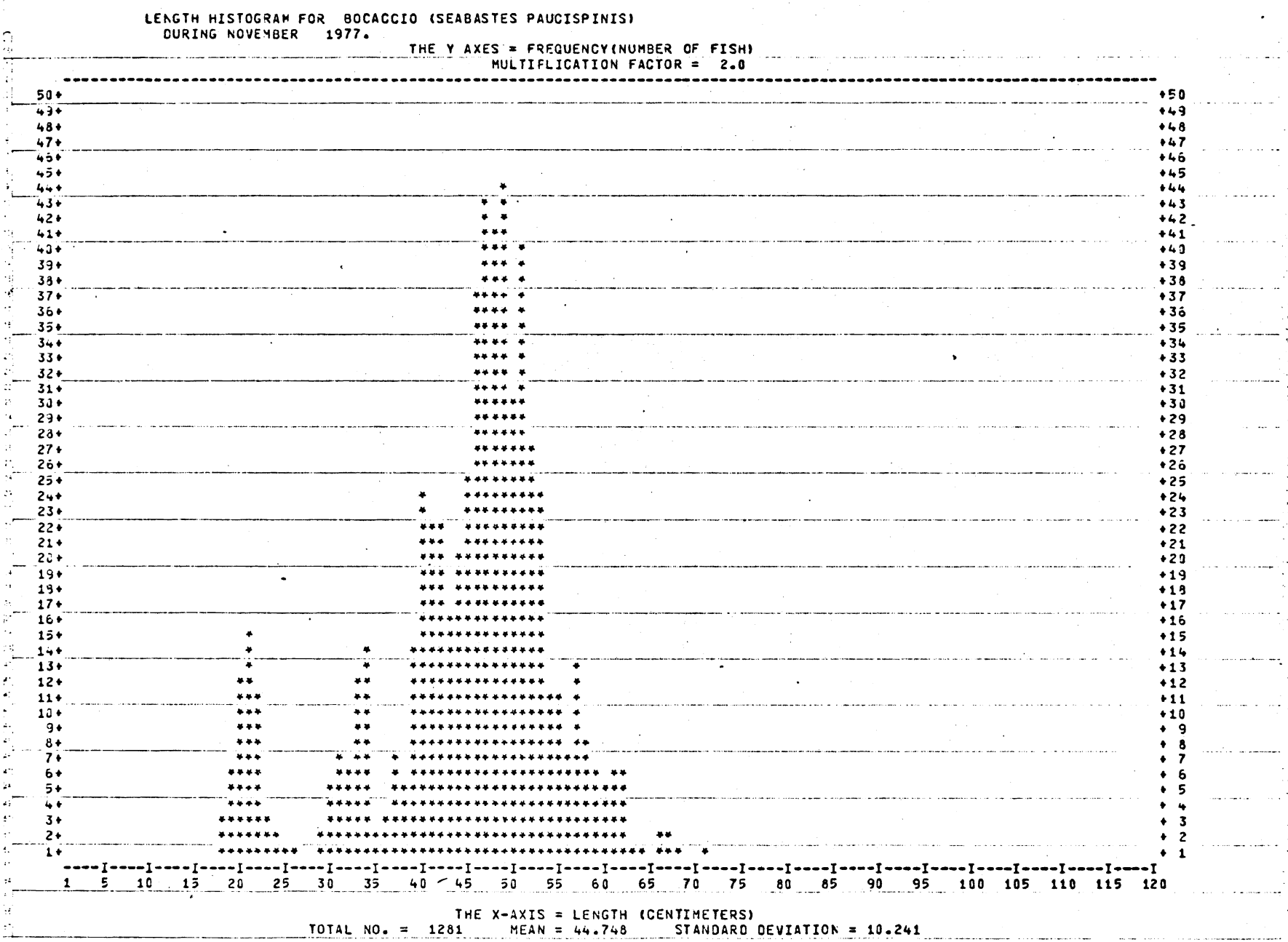


FIGURE 5. Length frequencies of bocaccio for November 1977.

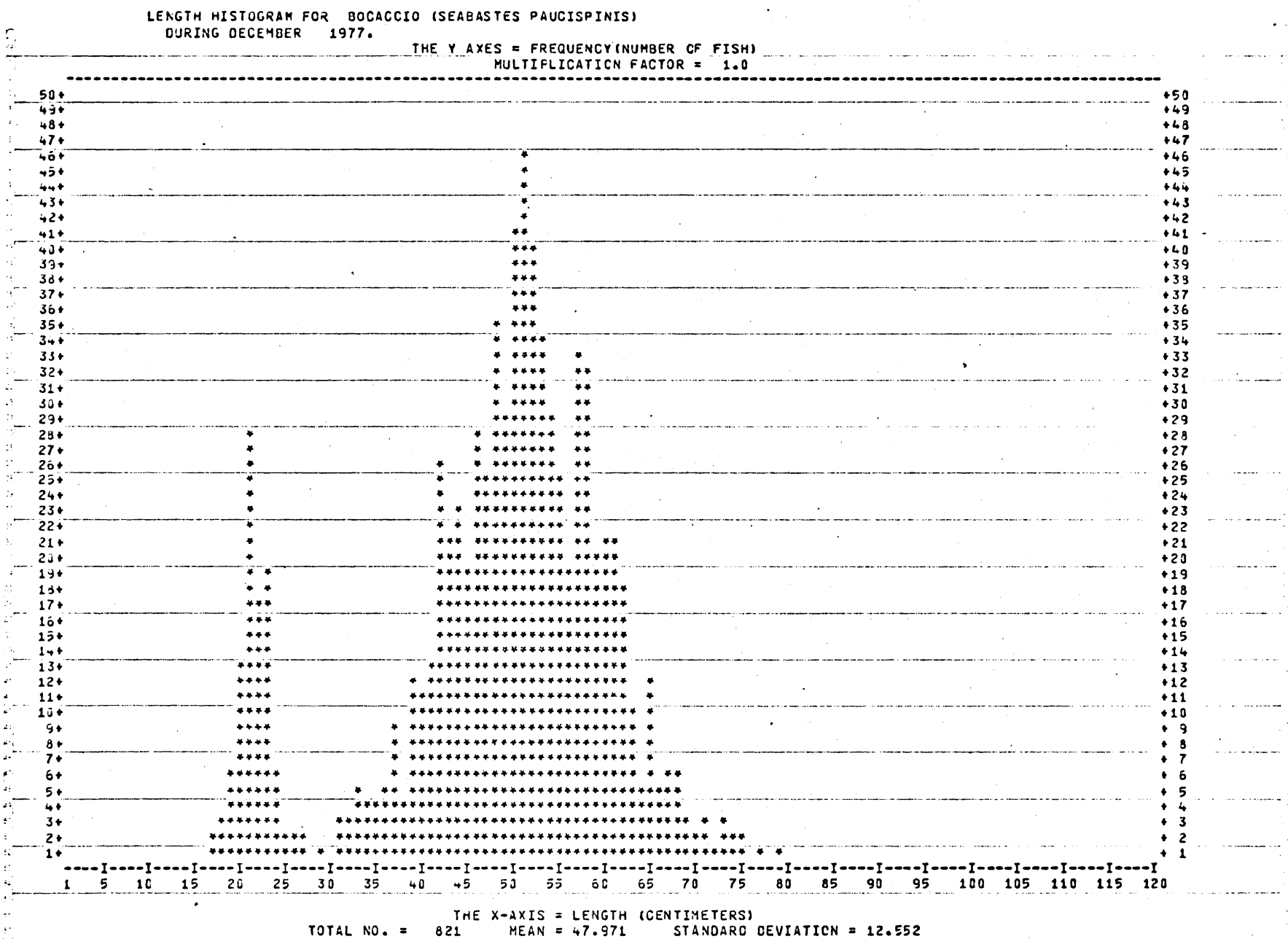


FIGURE 6. Length frequencies of bocaccio for December 1977.
Total No. Quarter 2,766 Mean Length Quarter 46.241 cm

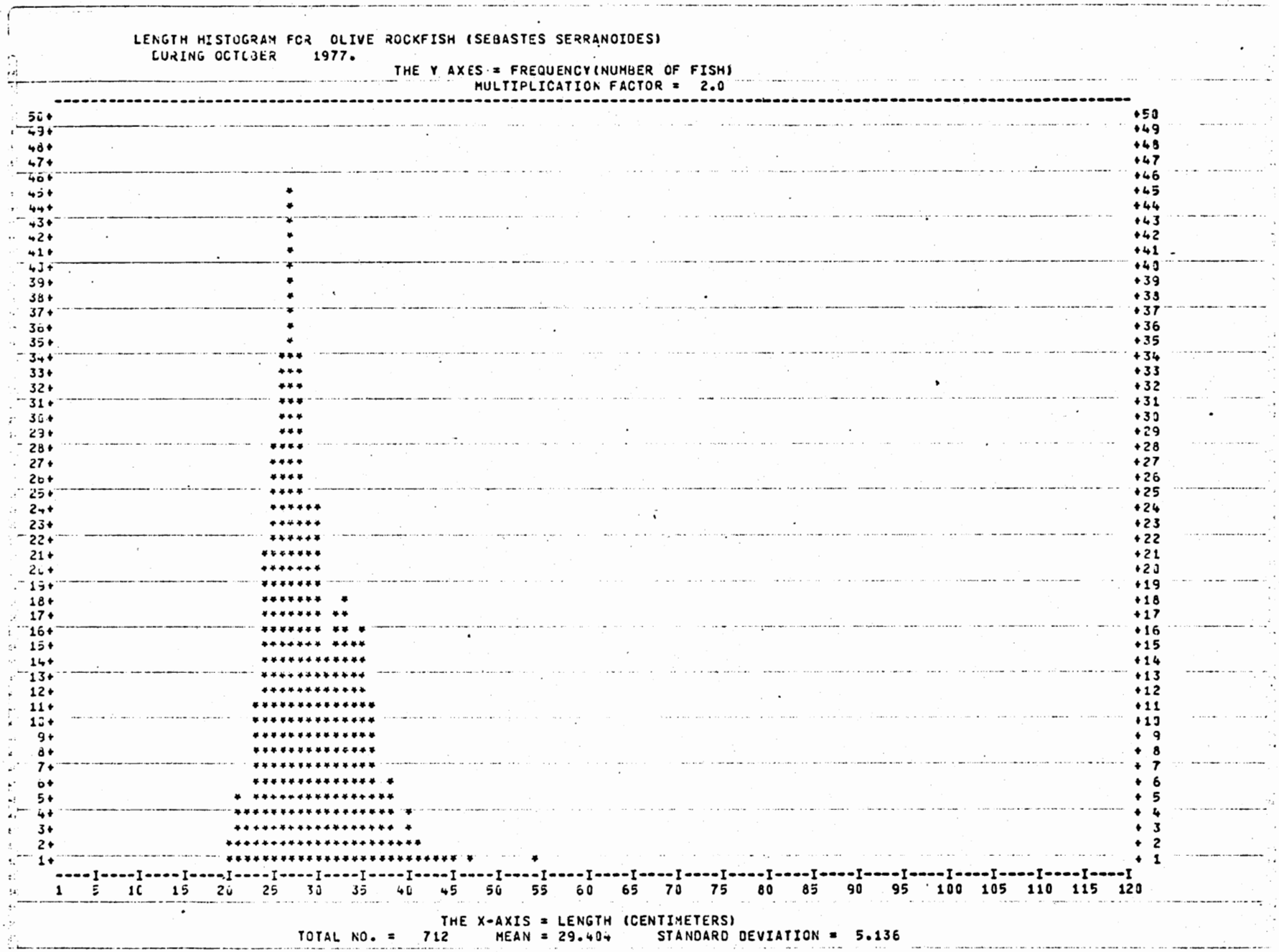


FIGURE 7. Length frequencies of olive rockfish for October 1977.

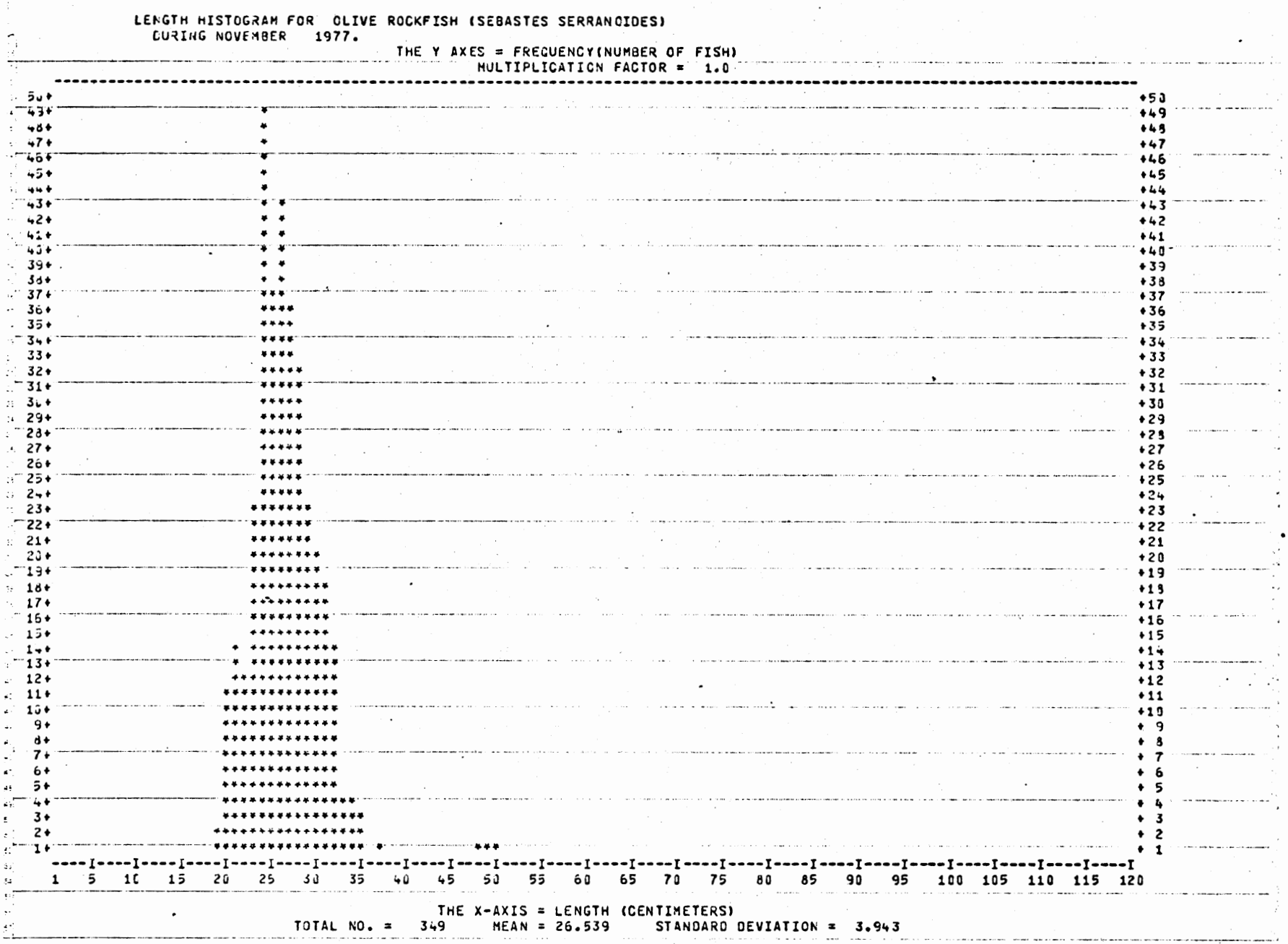


FIGURE 8. Length frequencies of olive rockfish for November 1977.

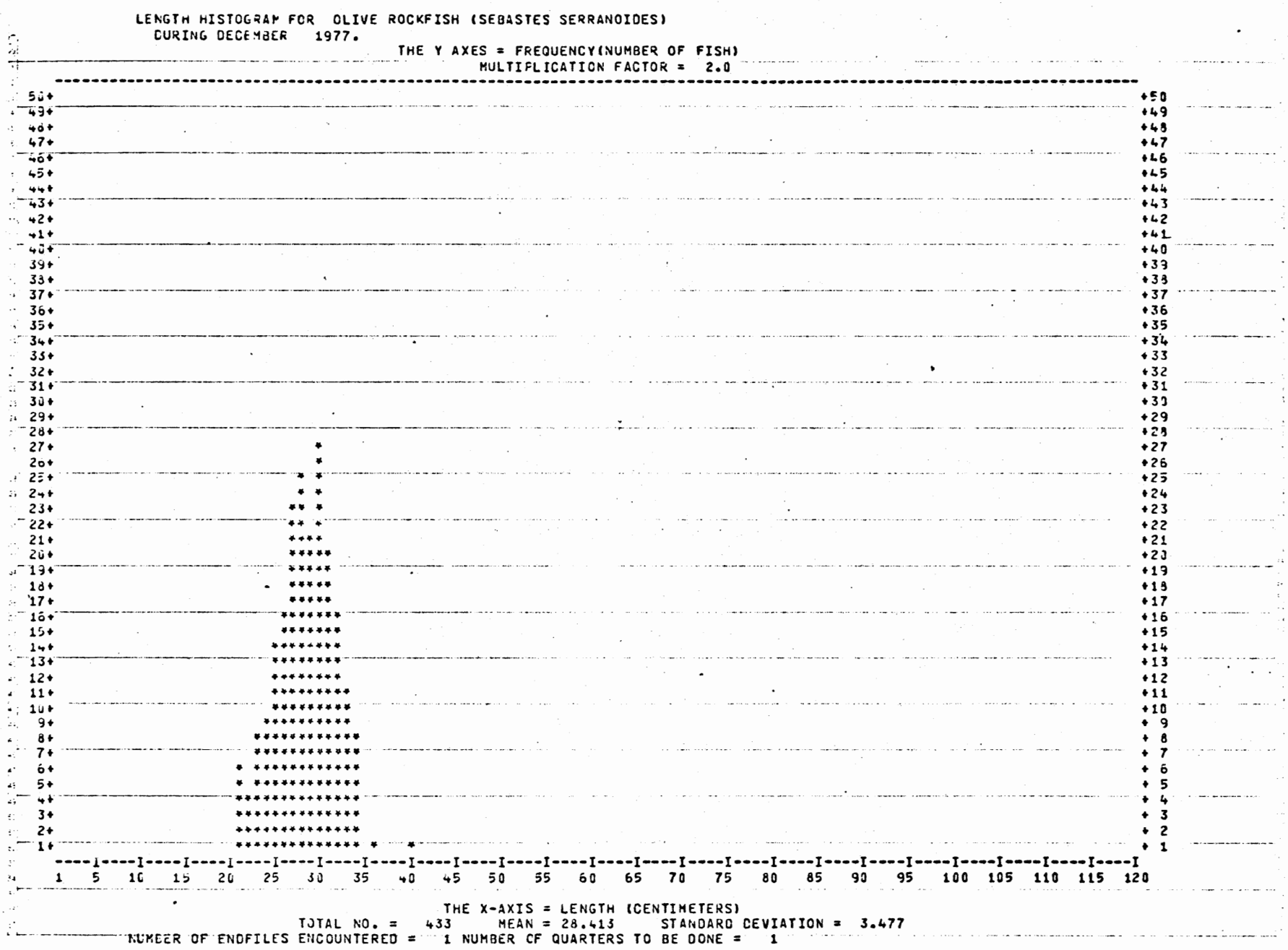


FIGURE 9. Length frequencies of olive rockfish for December 1977.
Total No. Quarter 1,494 Mean Length Quarter 28.447 cm

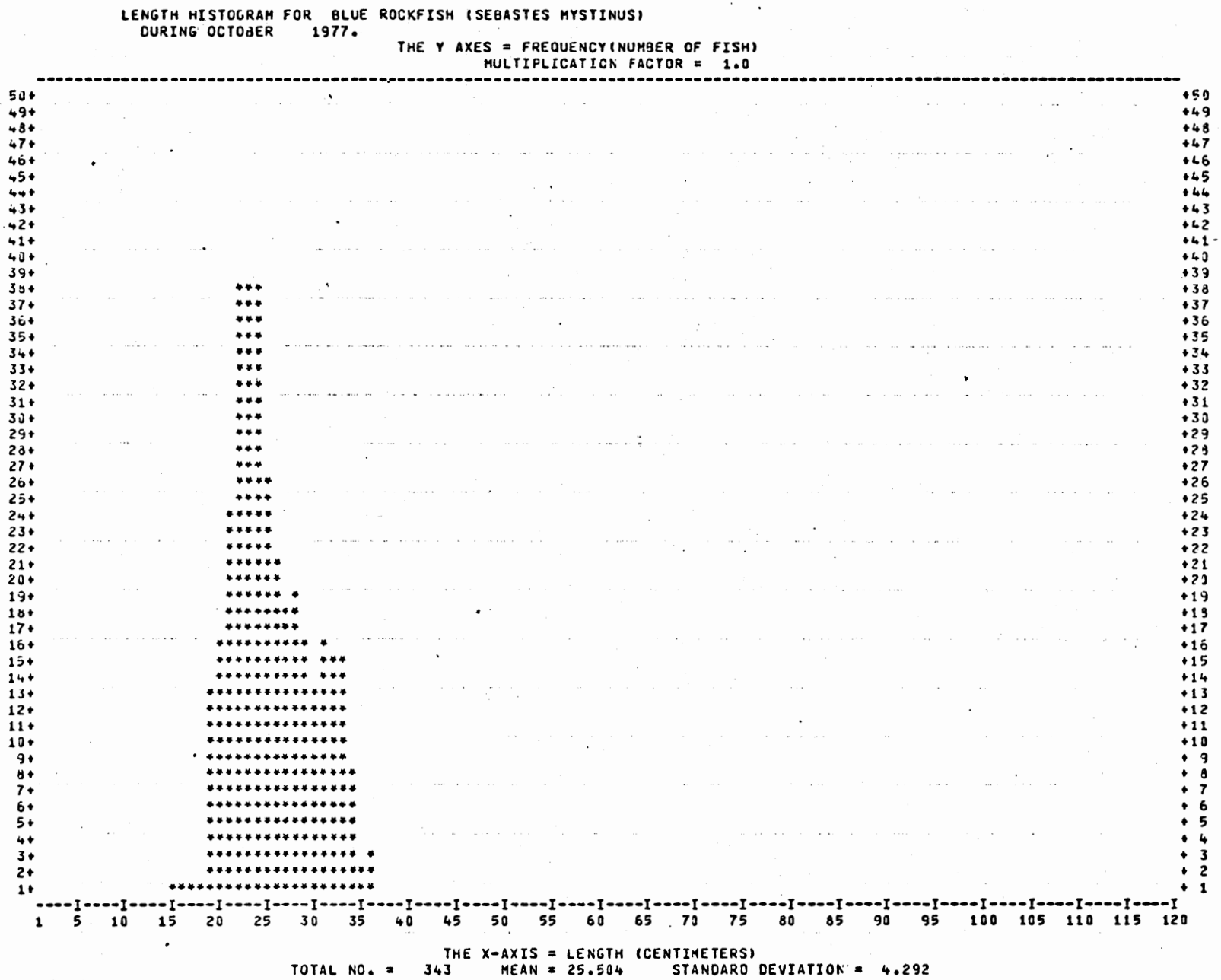


FIGURE 10. Length frequencies of blue rockfish for October 1977.

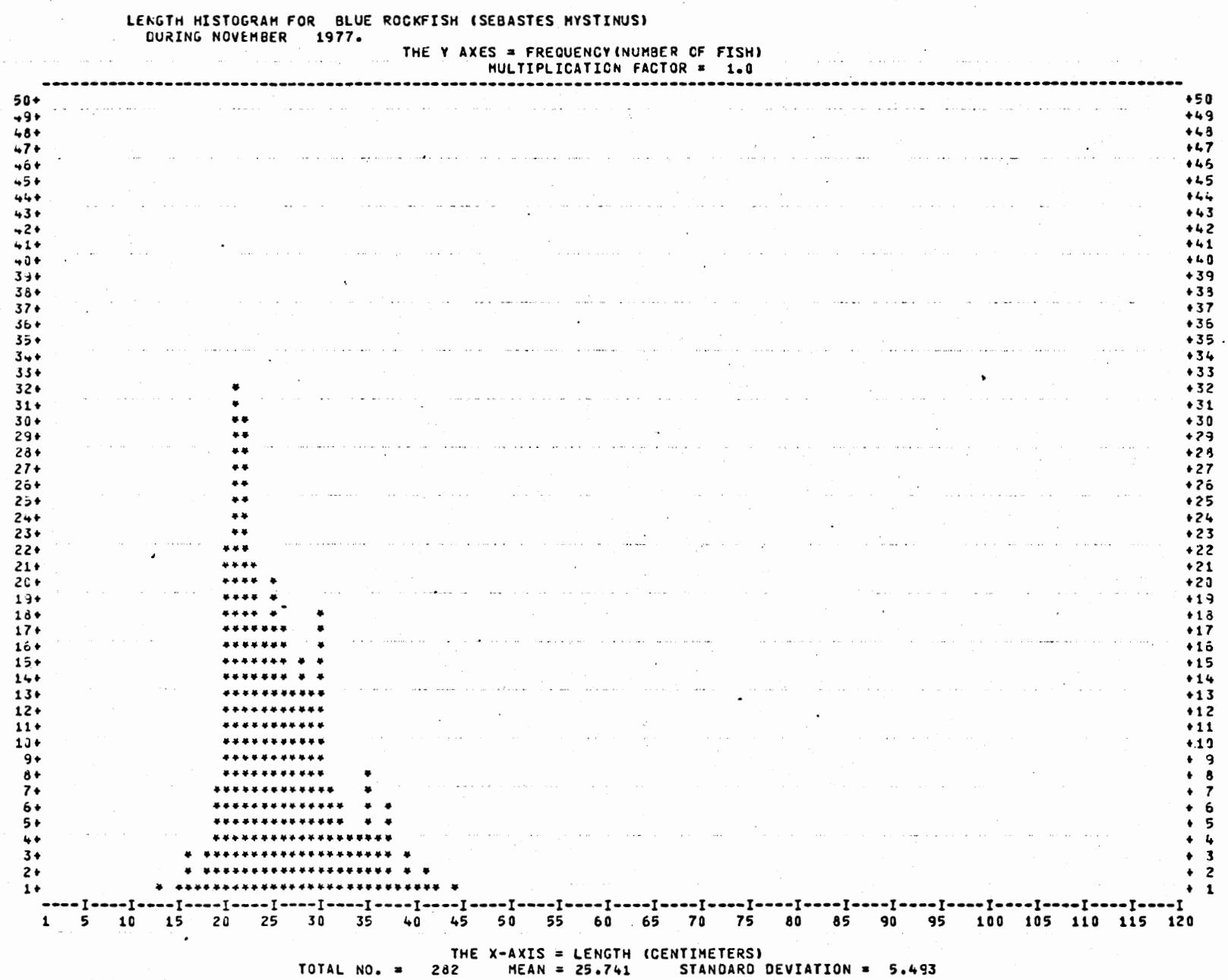


FIGURE 11. Length frequencies of blue rockfish for November 1977.

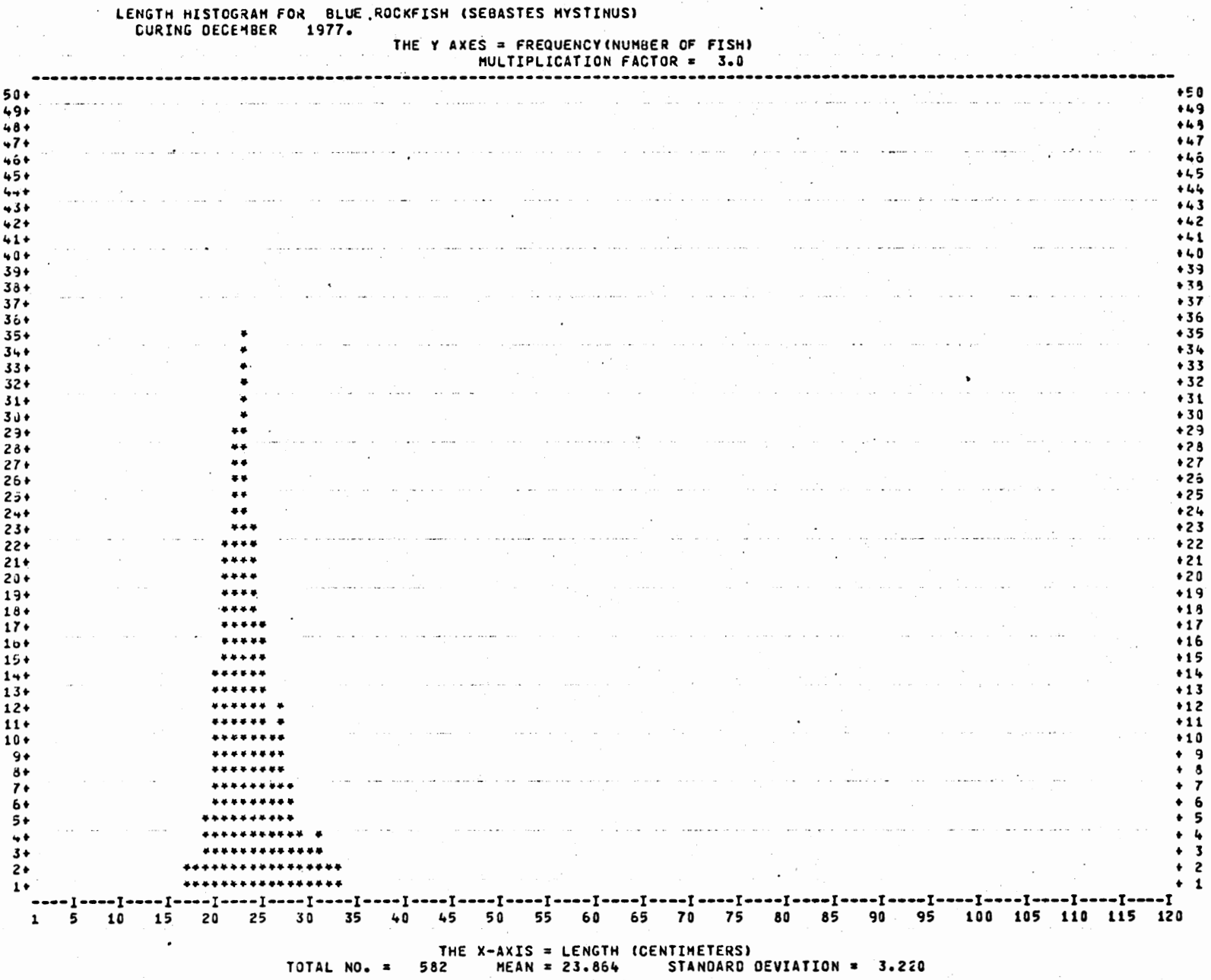


FIGURE 12. Length frequencies of blue rockfish for December 1977.
Total No. Quarter 1,207 Mean Length Quarter 24.768 cm

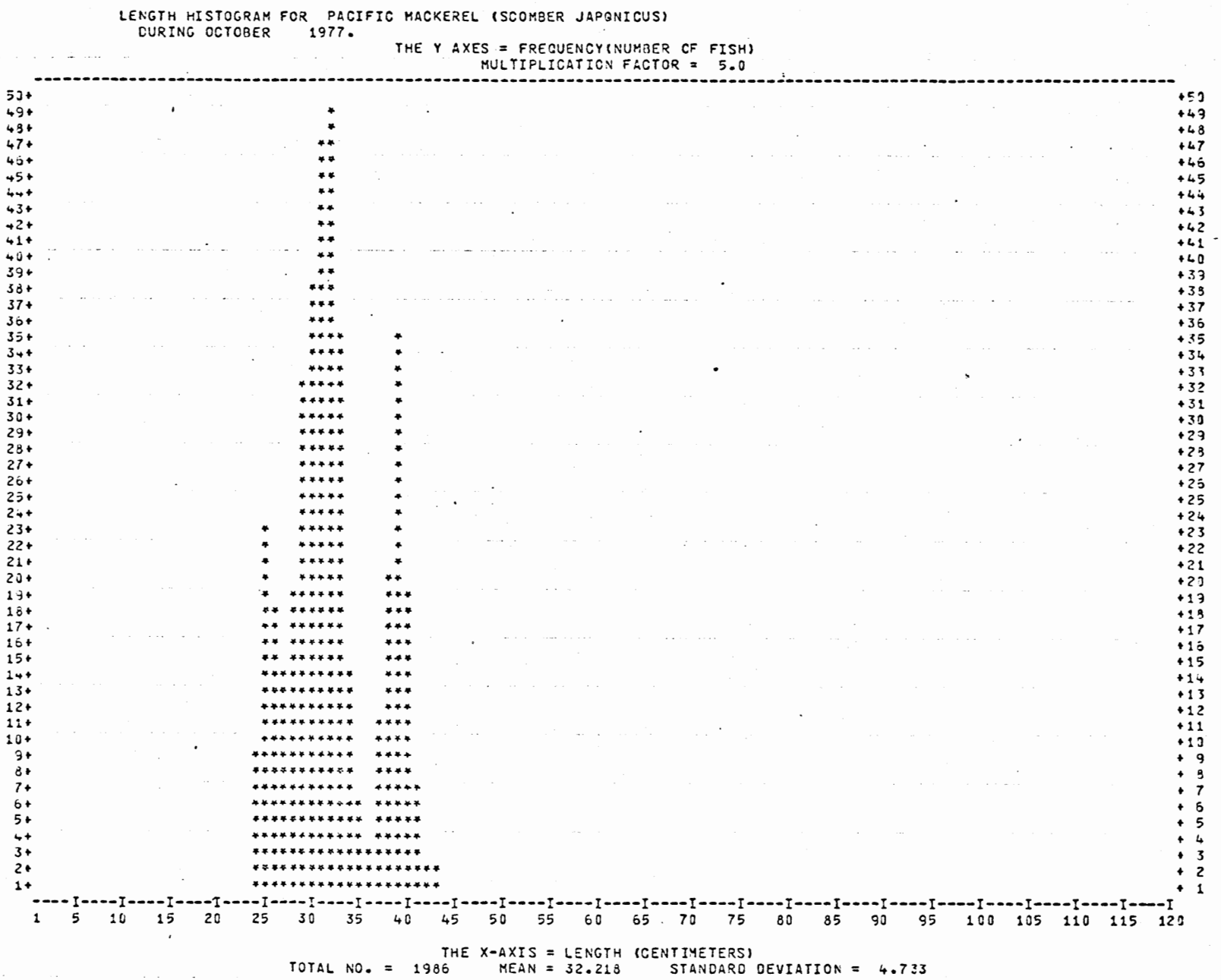


FIGURE 13. Length frequencies of Pacific mackerel for October 1977.

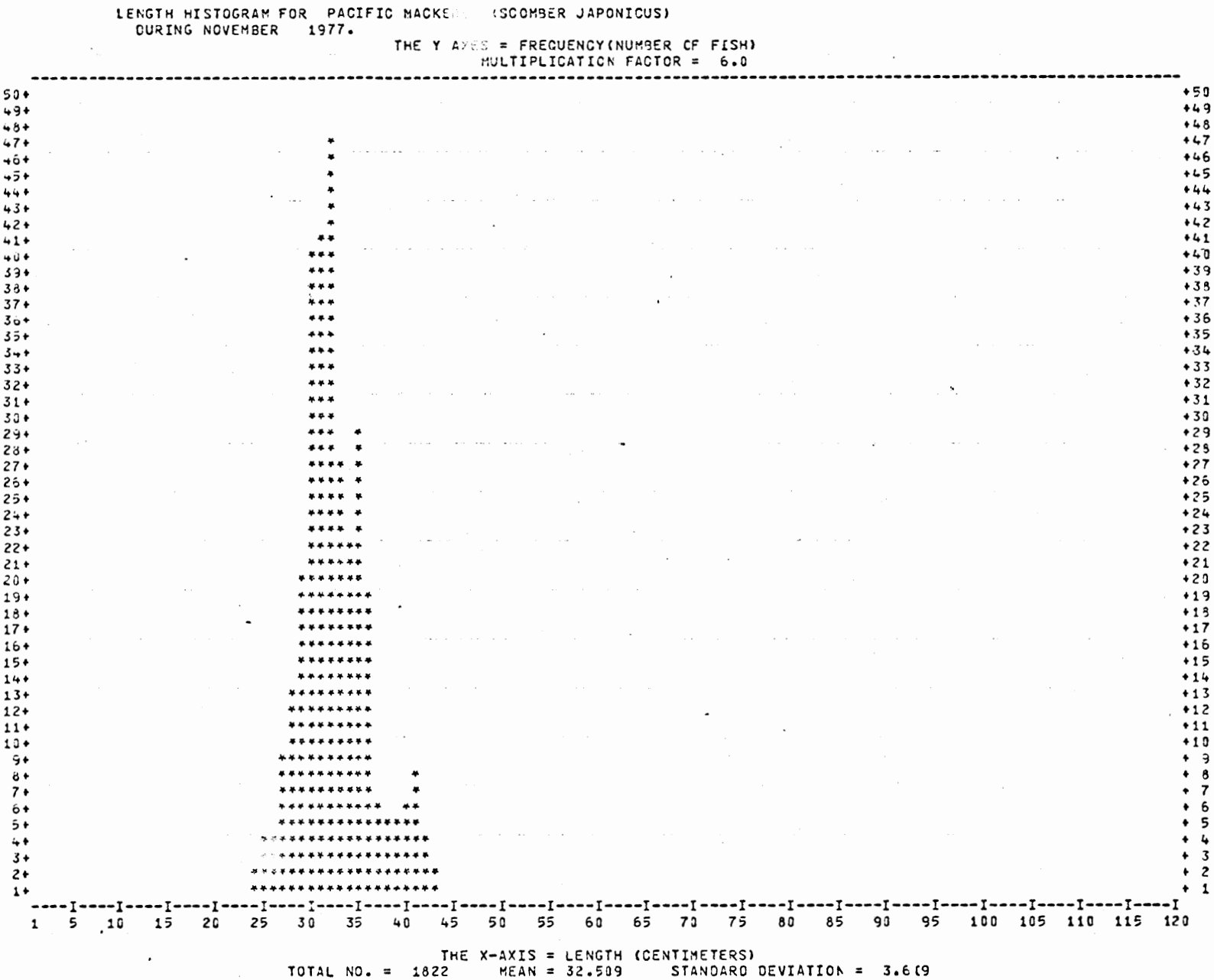


FIGURE 14. Length frequencies of Pacific mackerel for November 1977.

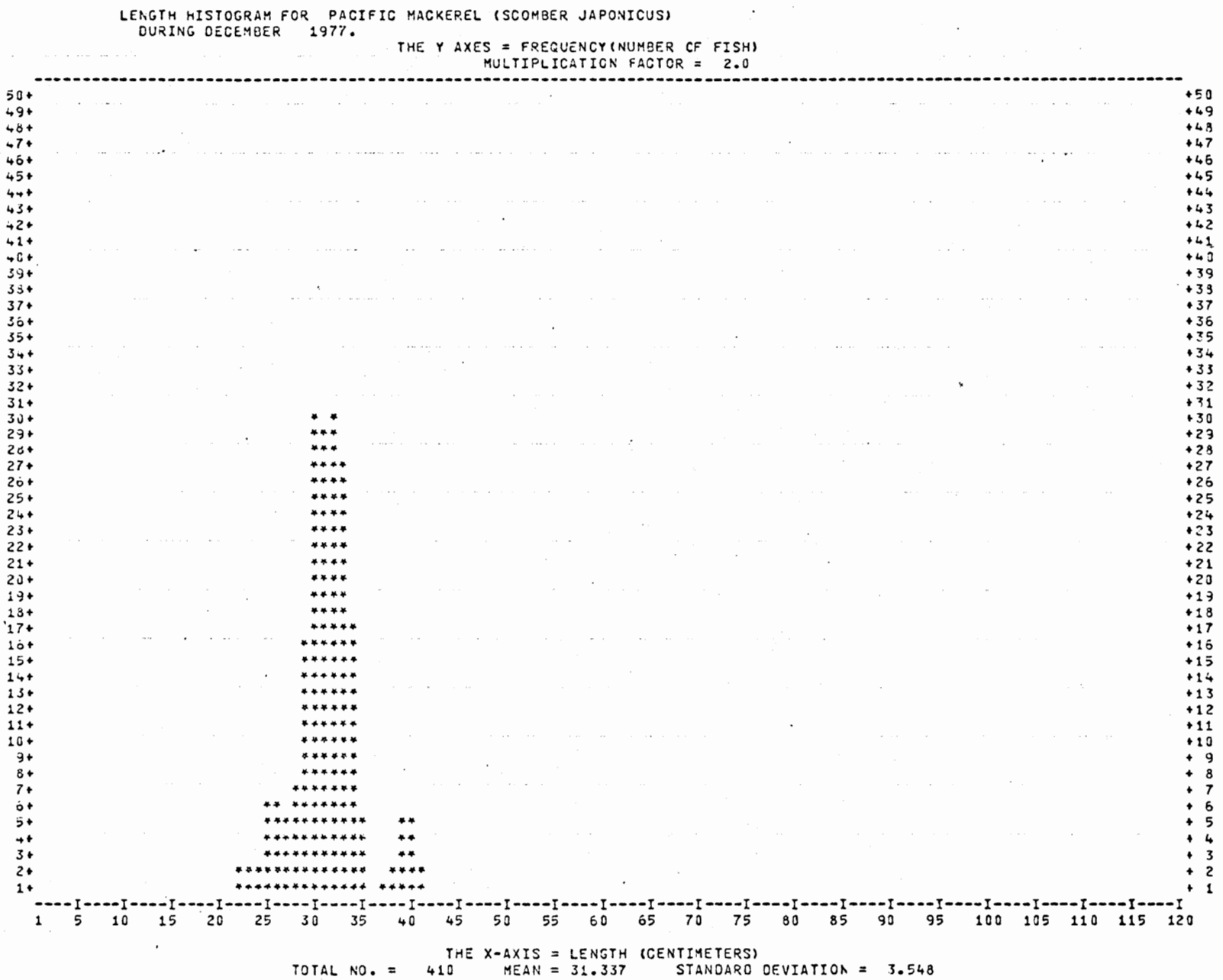


FIGURE 15. Length frequencies of Pacific mackerel for December 1977.
Total No. Quarter 4,218 Mean Length Quarter 32.258 cm

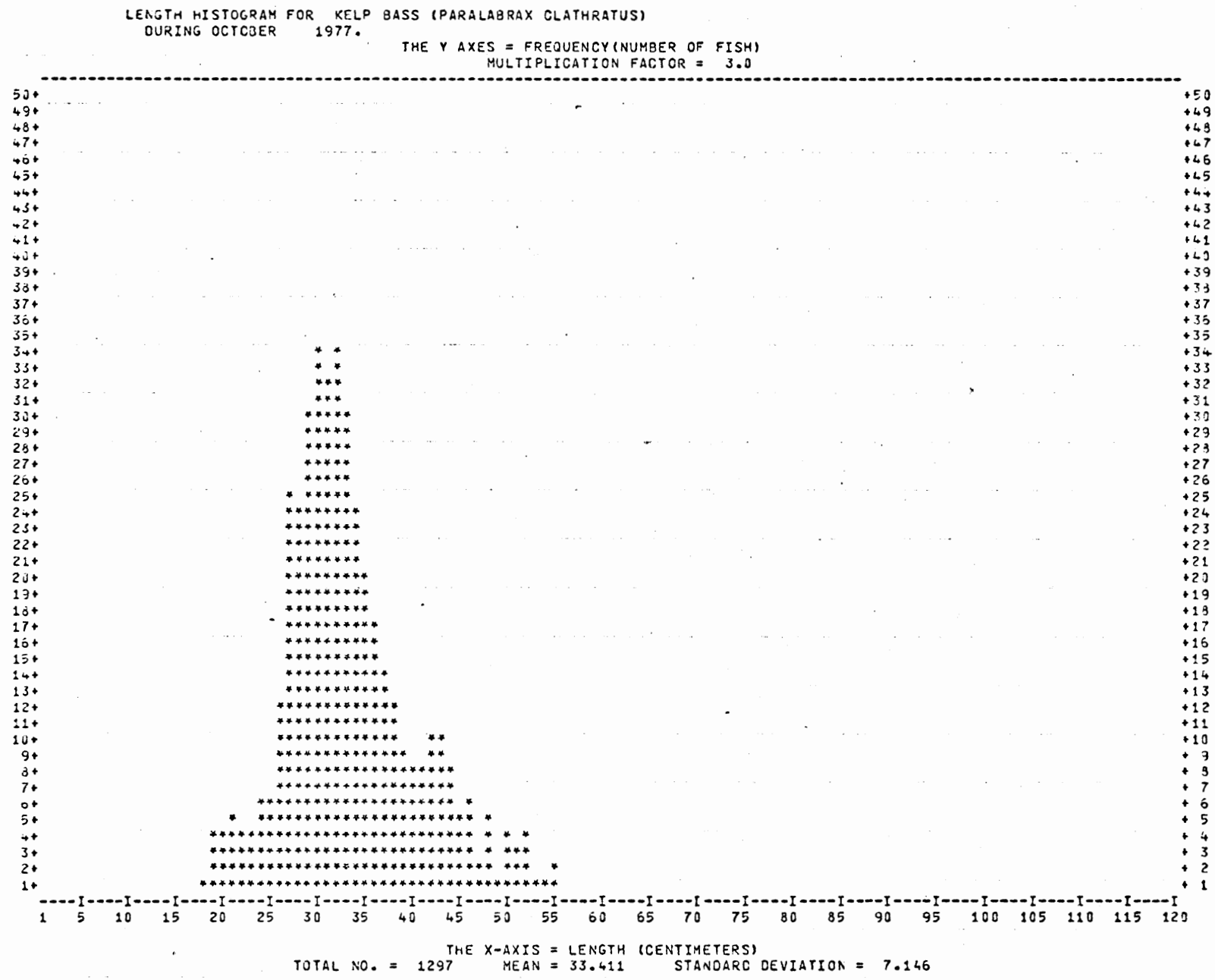


FIGURE 16. Length frequencies of kelp bass for October 1977.

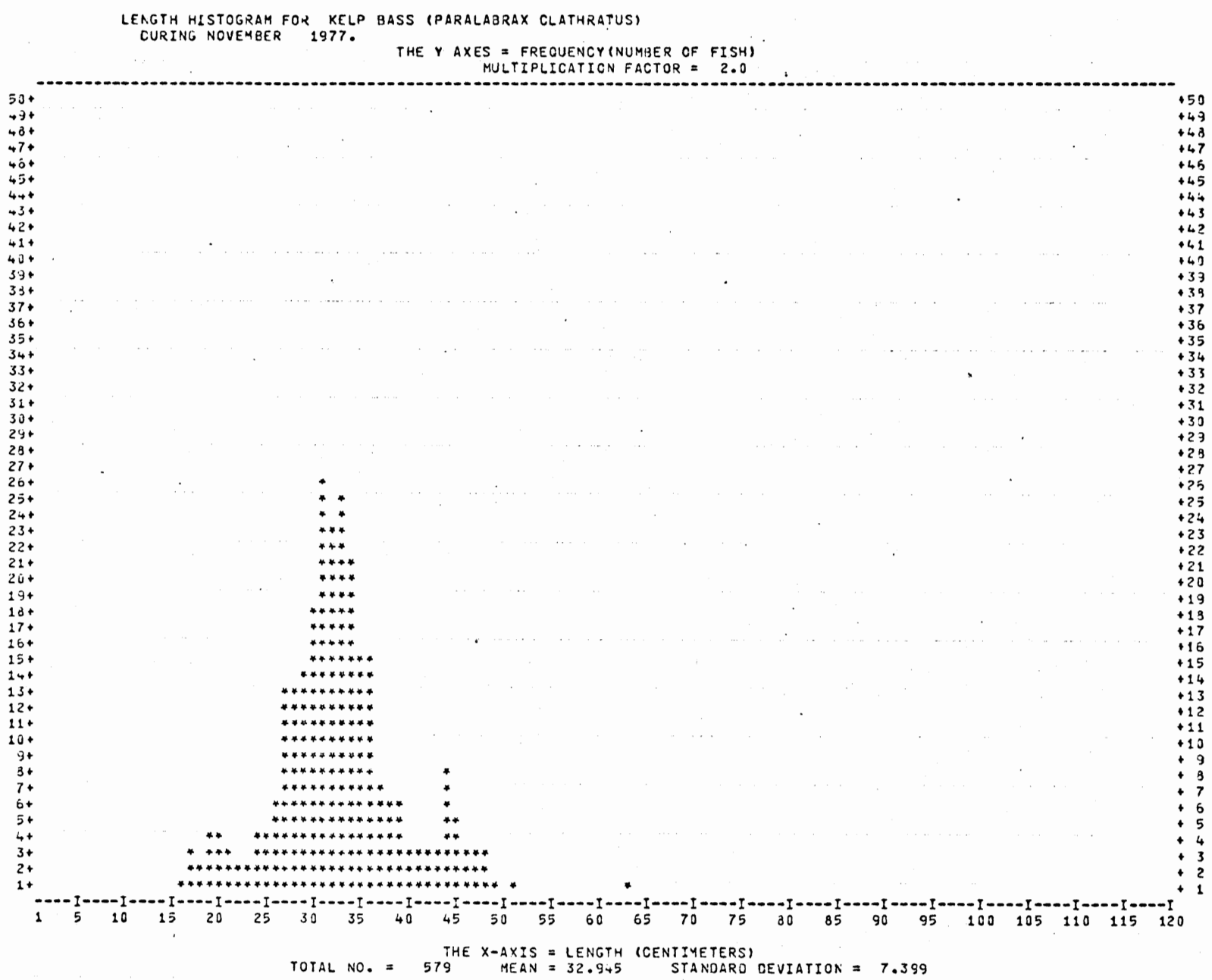


FIGURE 17. Length frequencies of kelp bass for November 1977.

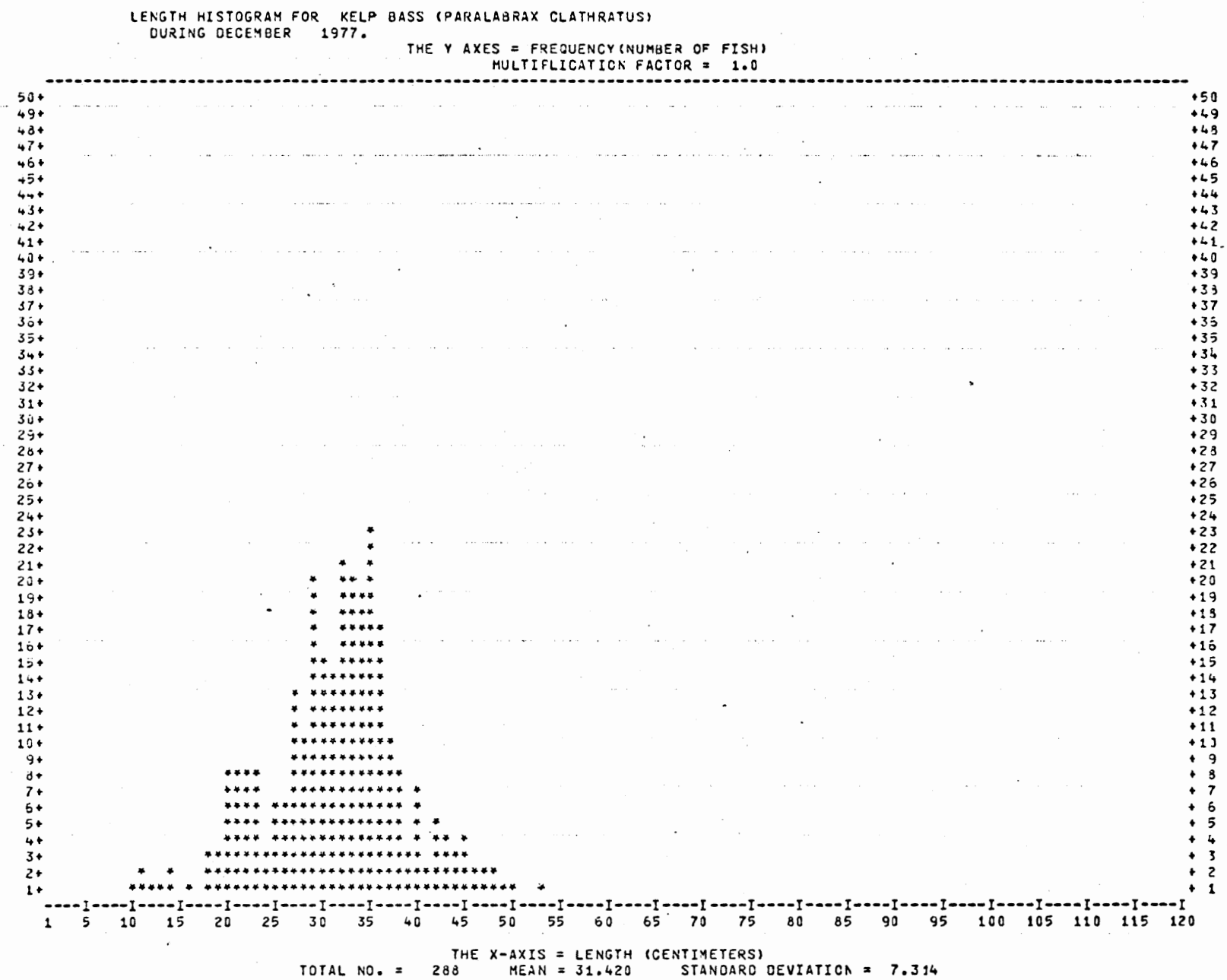


FIGURE 18. Length frequencies of kelp bass for December 1977.
Total No. Quarter 2,164 Mean Length Quarter 33.021 cm

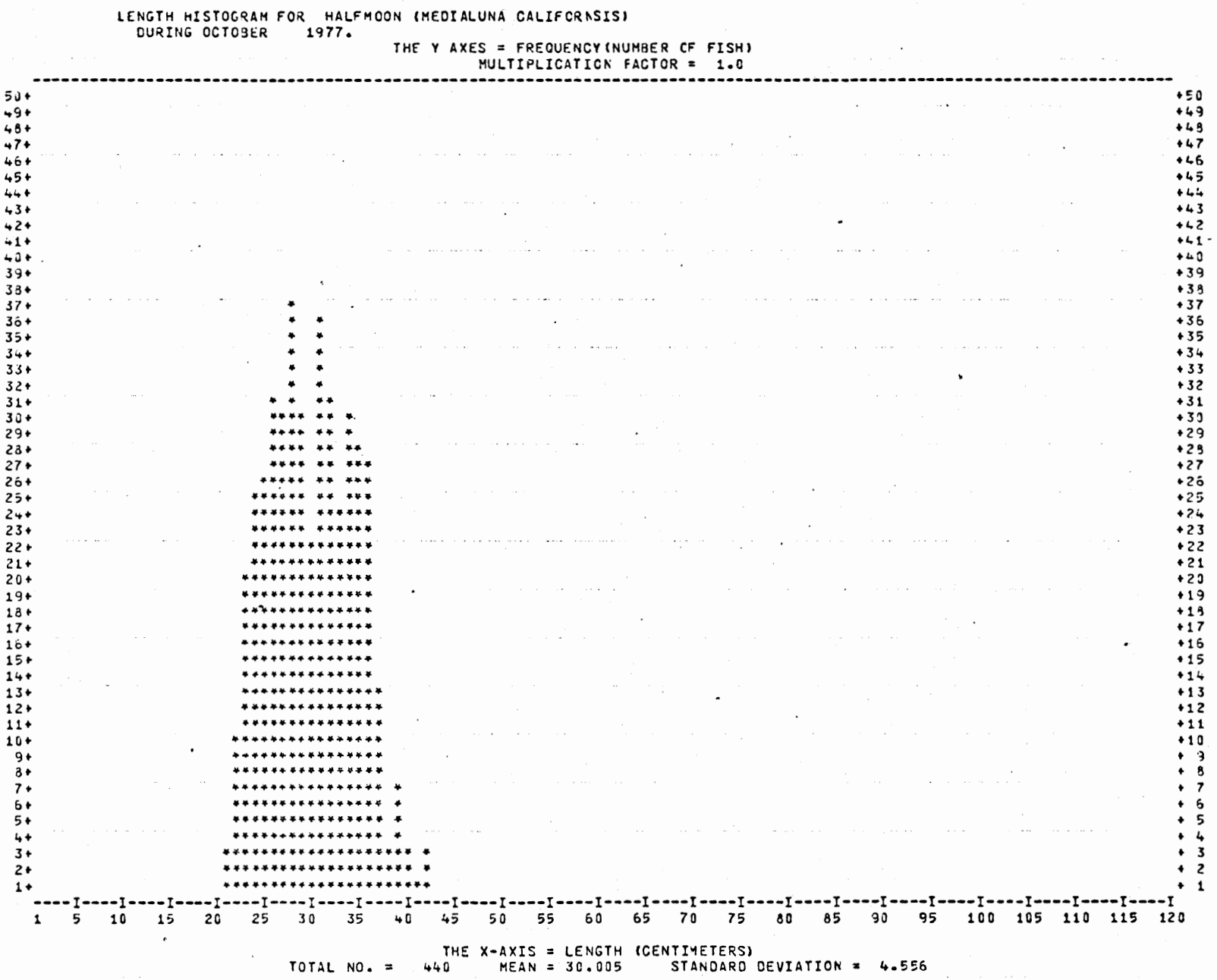


FIGURE 19. Length frequencies of halfmoon for October 1977.

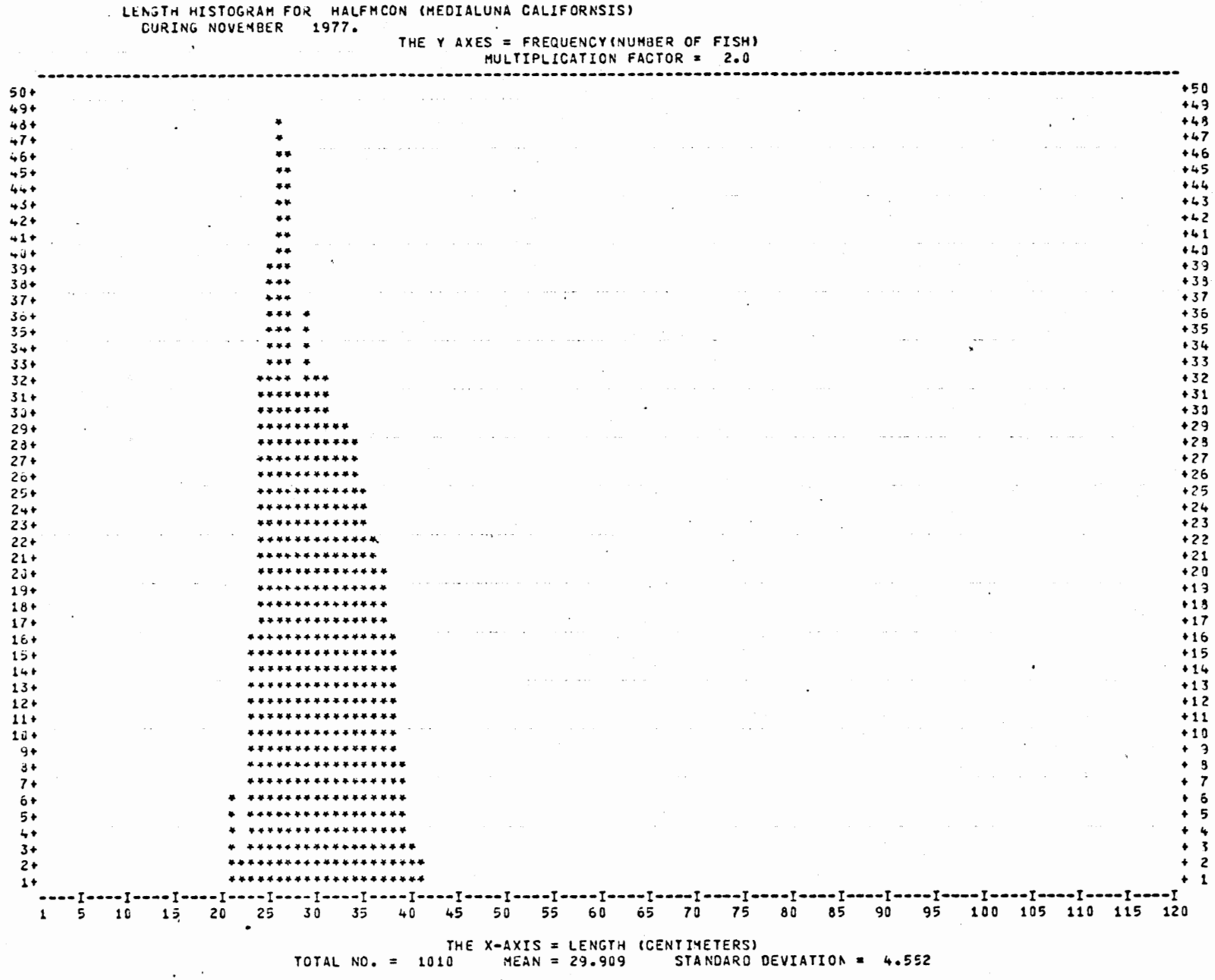


FIGURE 20. Length frequencies of halfmoon for November 1977.

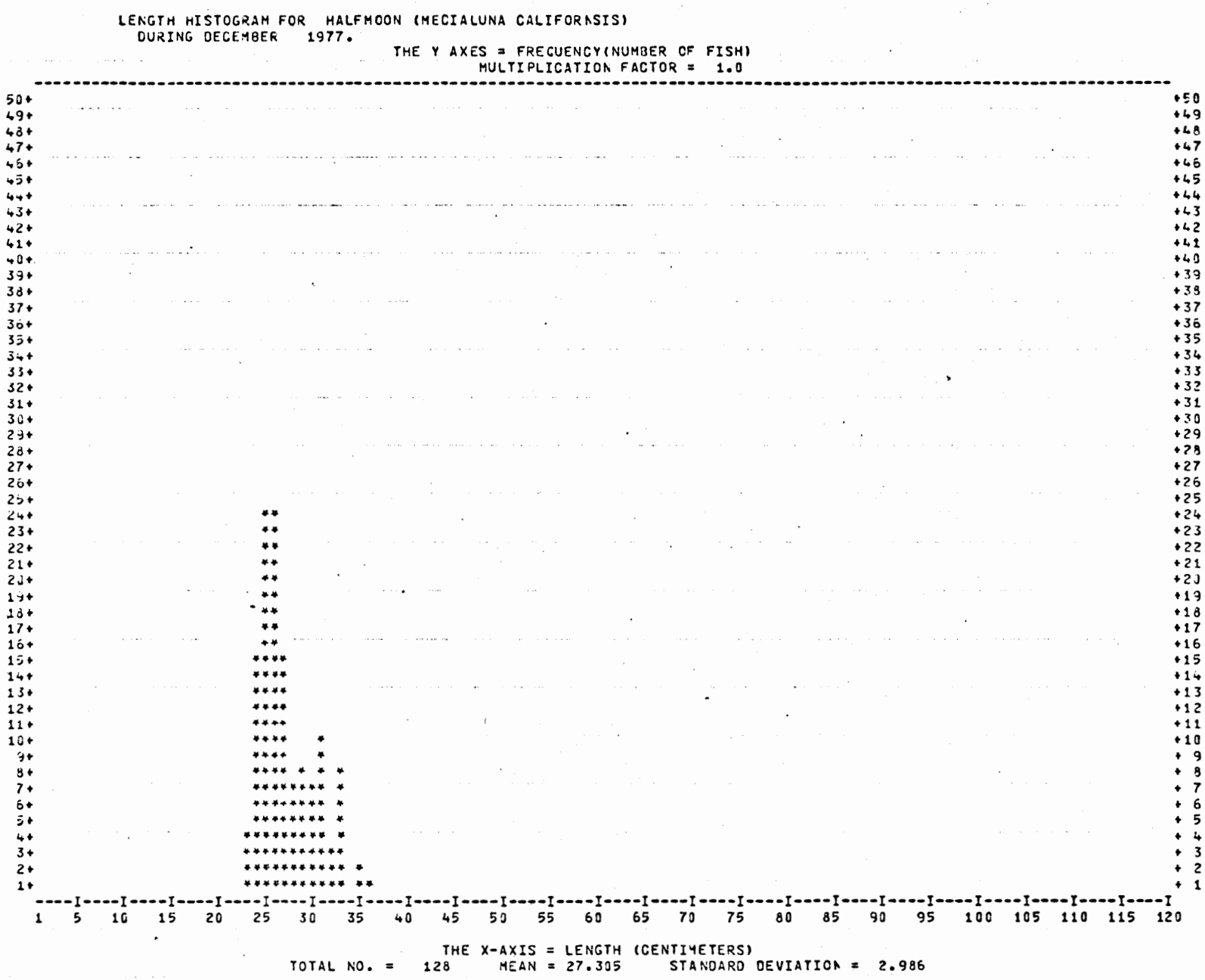


FIGURE 21. Length frequencies of halfmoon for December 1977.
Total No. Quarter 1,578 Mean Length Quarter 29.724 cm

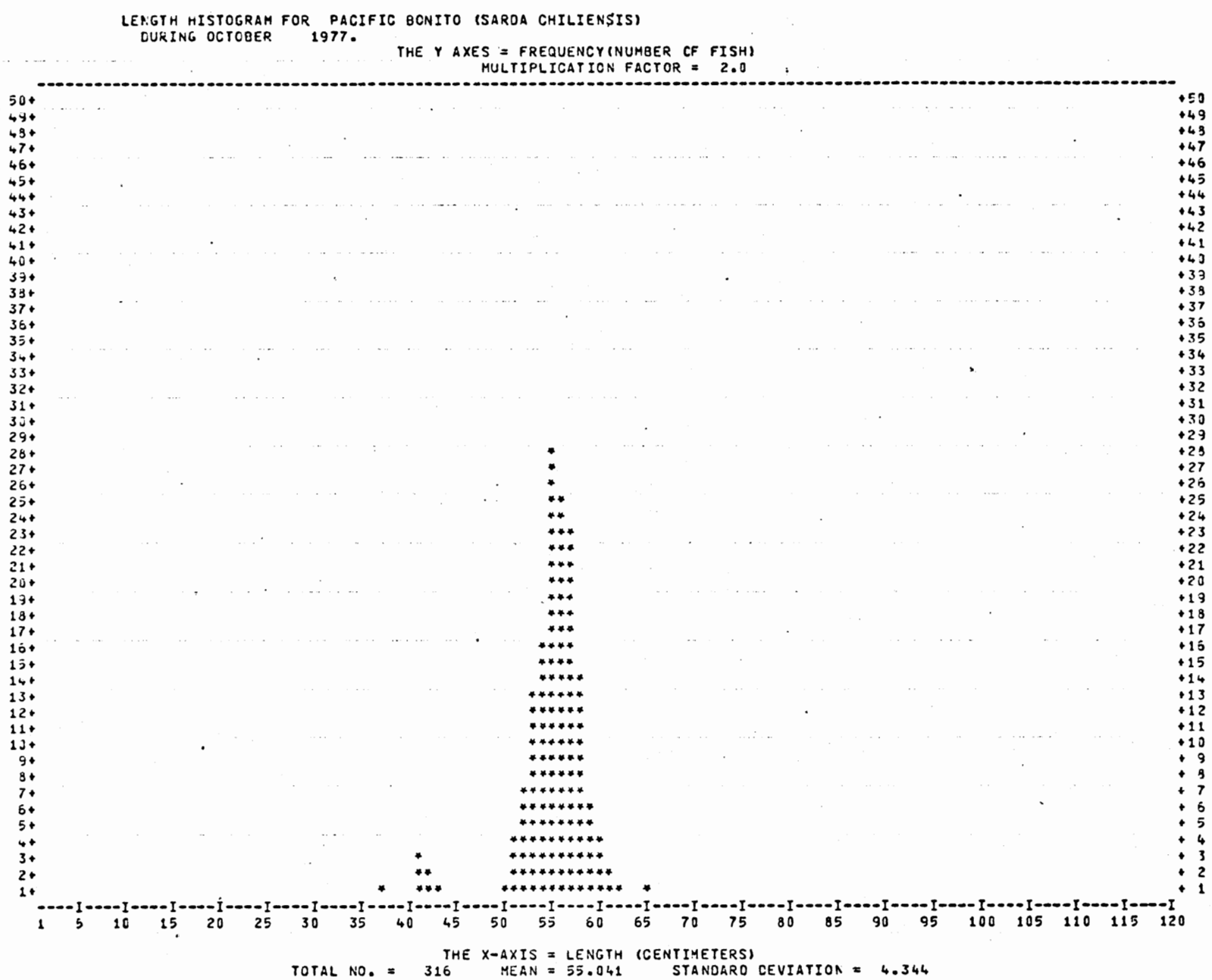


FIGURE 22. Length frequencies of Pacific bonito for October 1977.

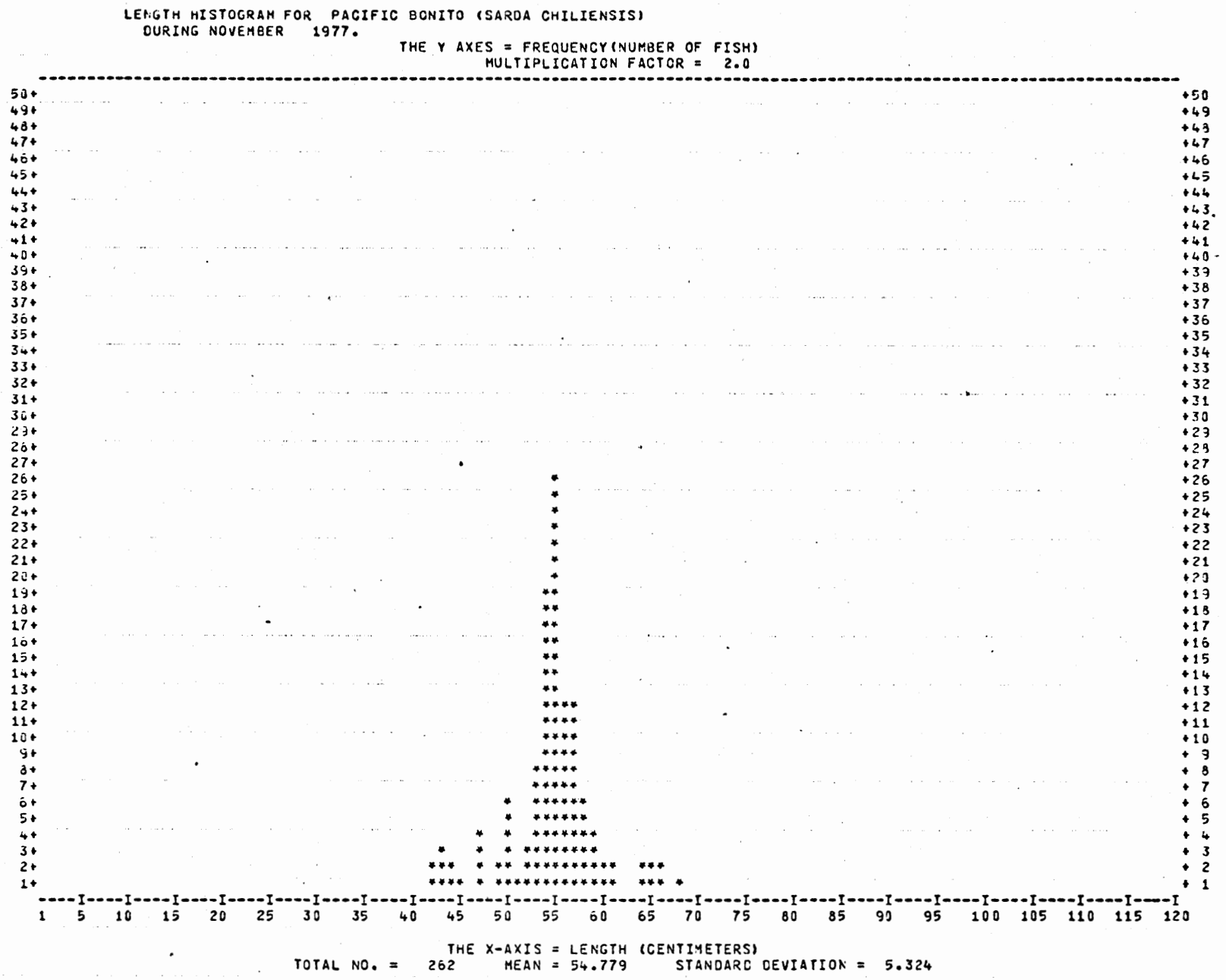


FIGURE 23. Length frequencies of Pacific bonito for November 1977.

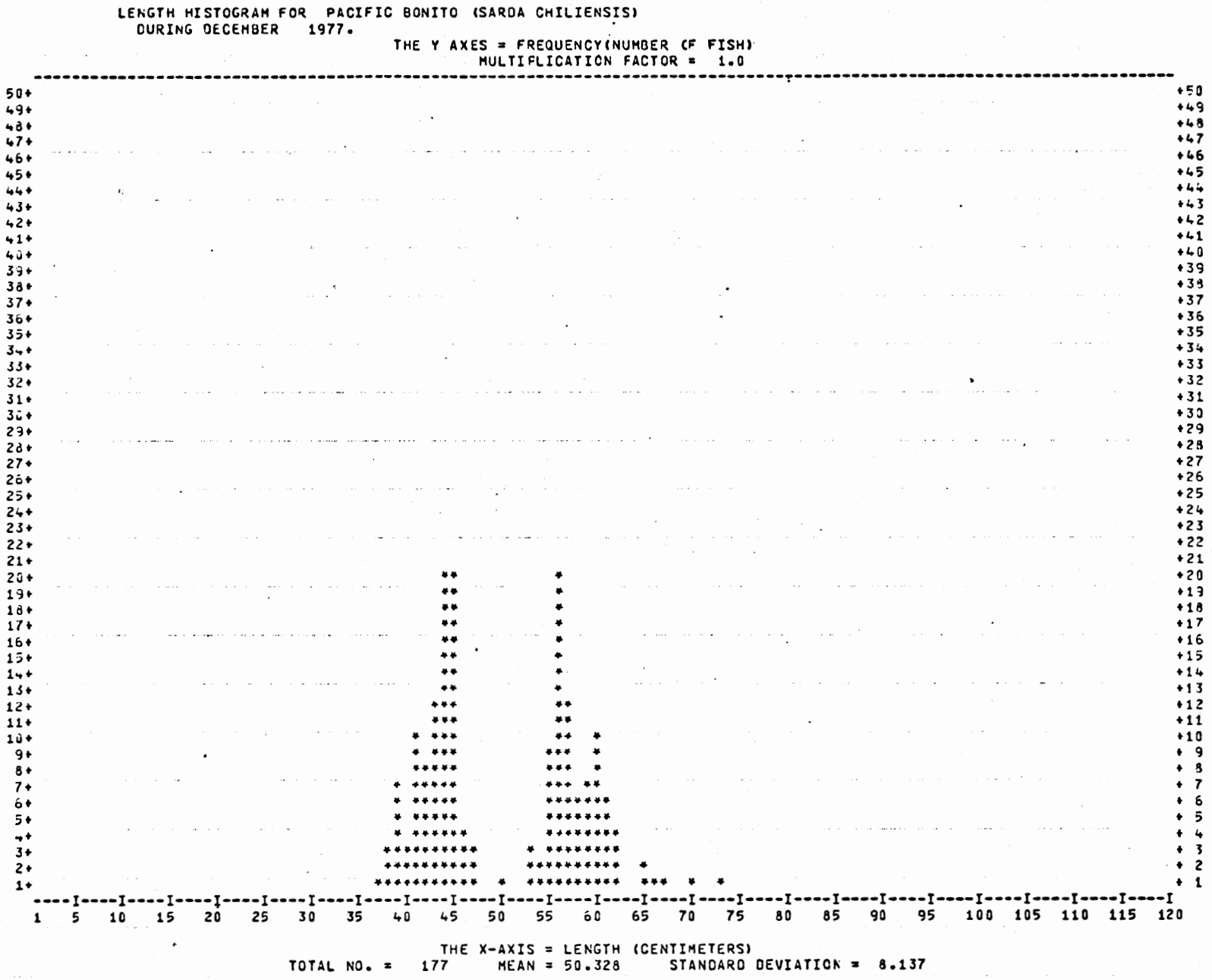


FIGURE 24. Length frequencies of Pacific bonito for December 1977.
Total No. Quarter 755 Mean Length Quarter 53.845 cm

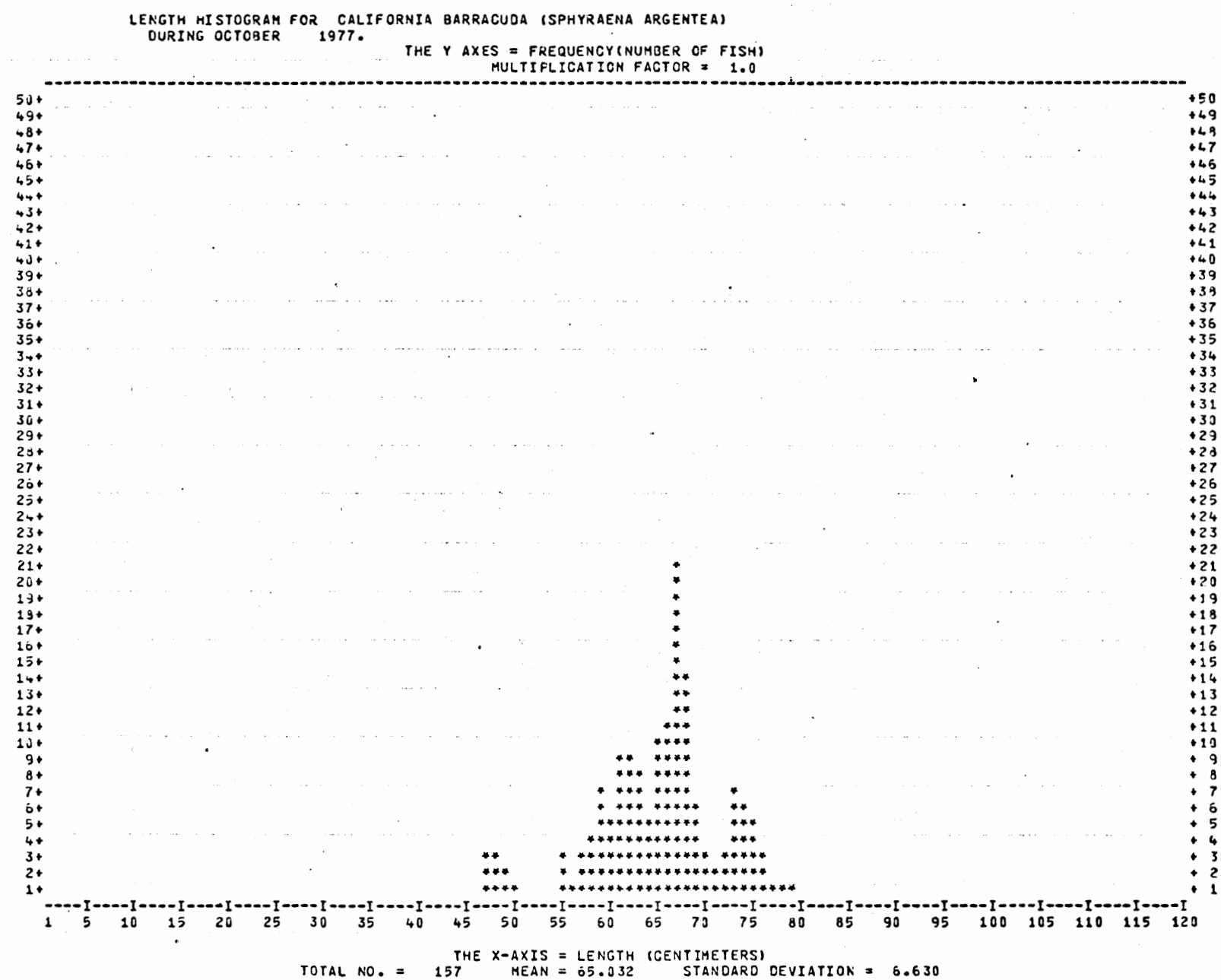


FIGURE 25. Length frequencies of California barracuda for October 1977.

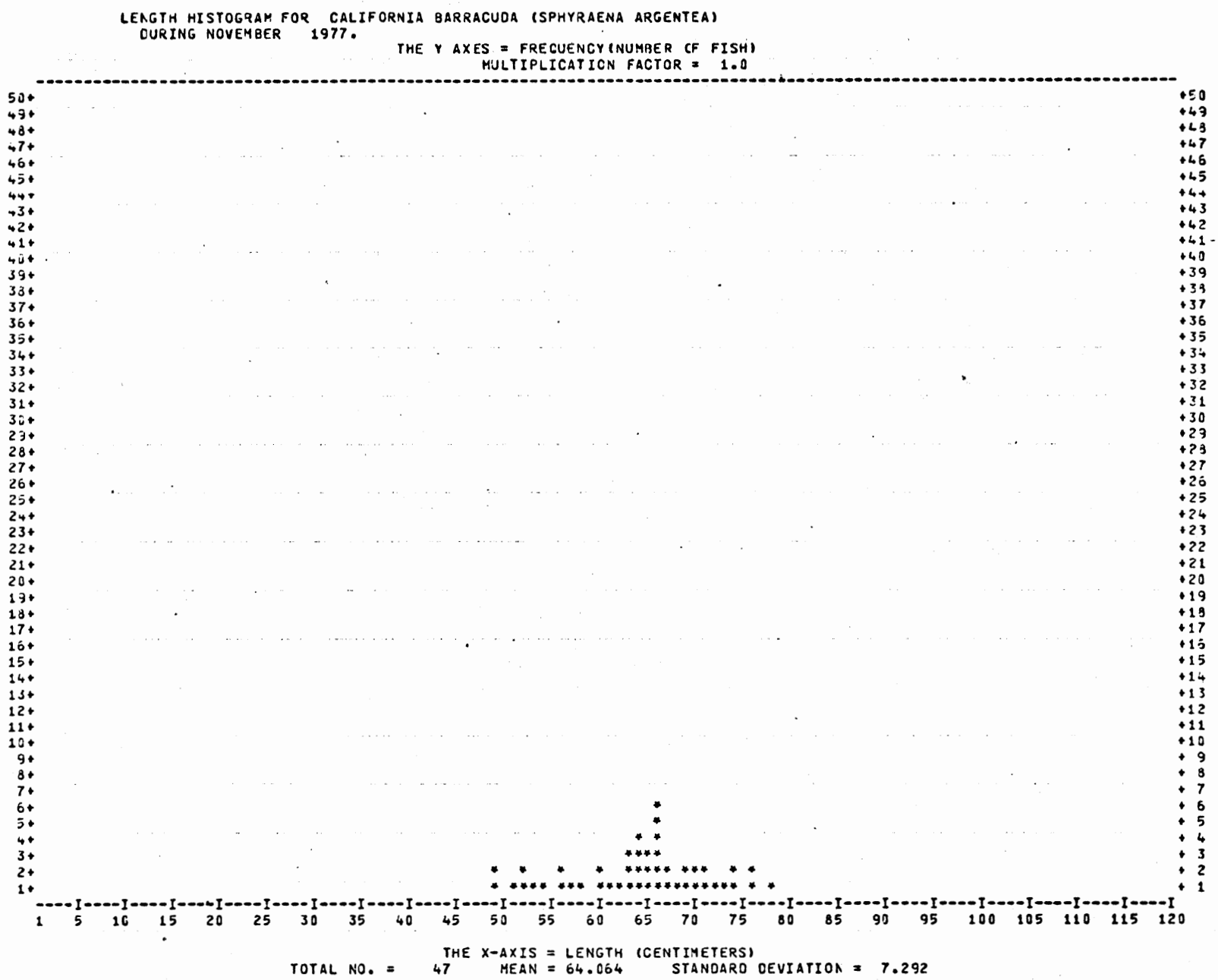


FIGURE 26. Length frequencies of California barracuda for November 1977.

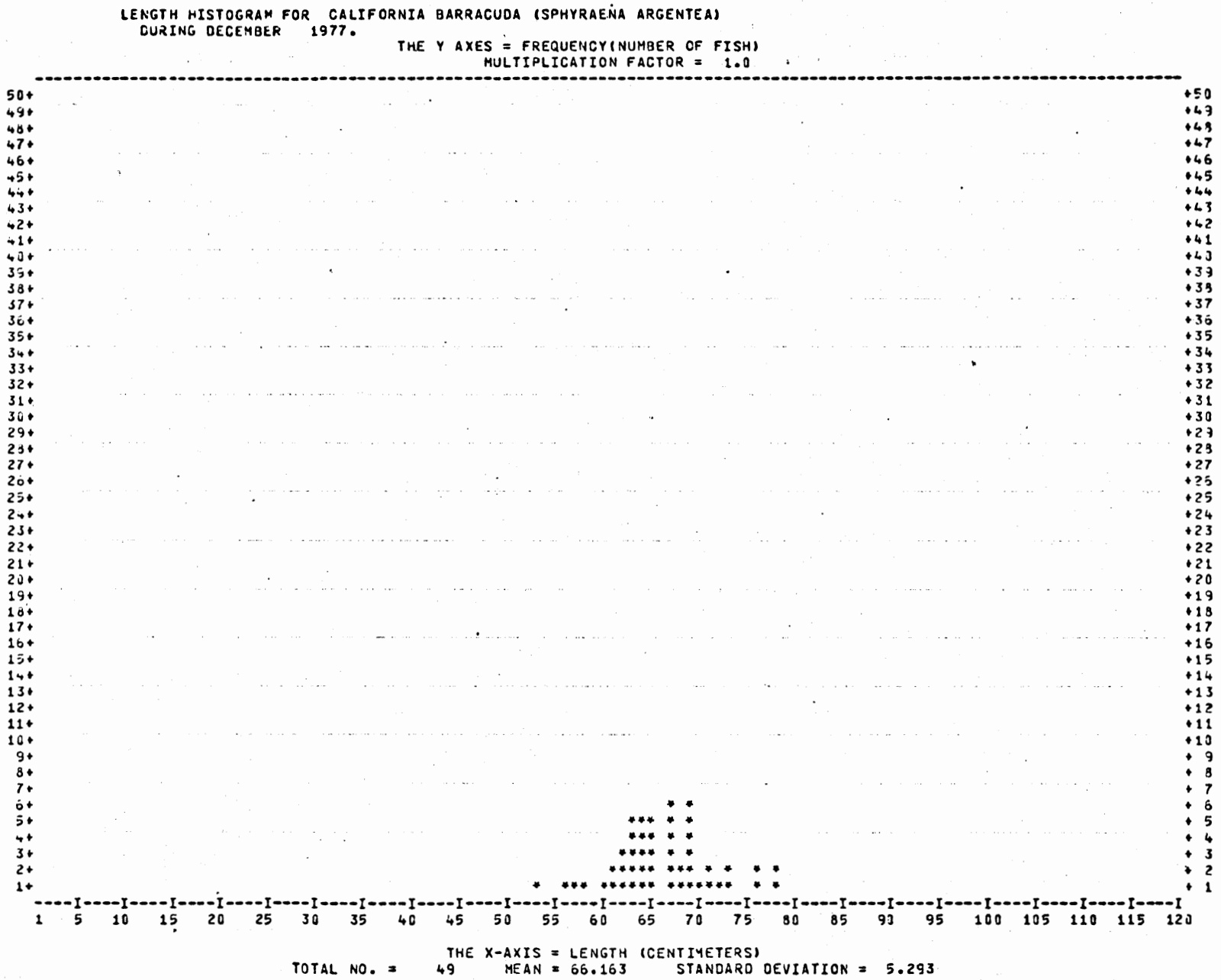
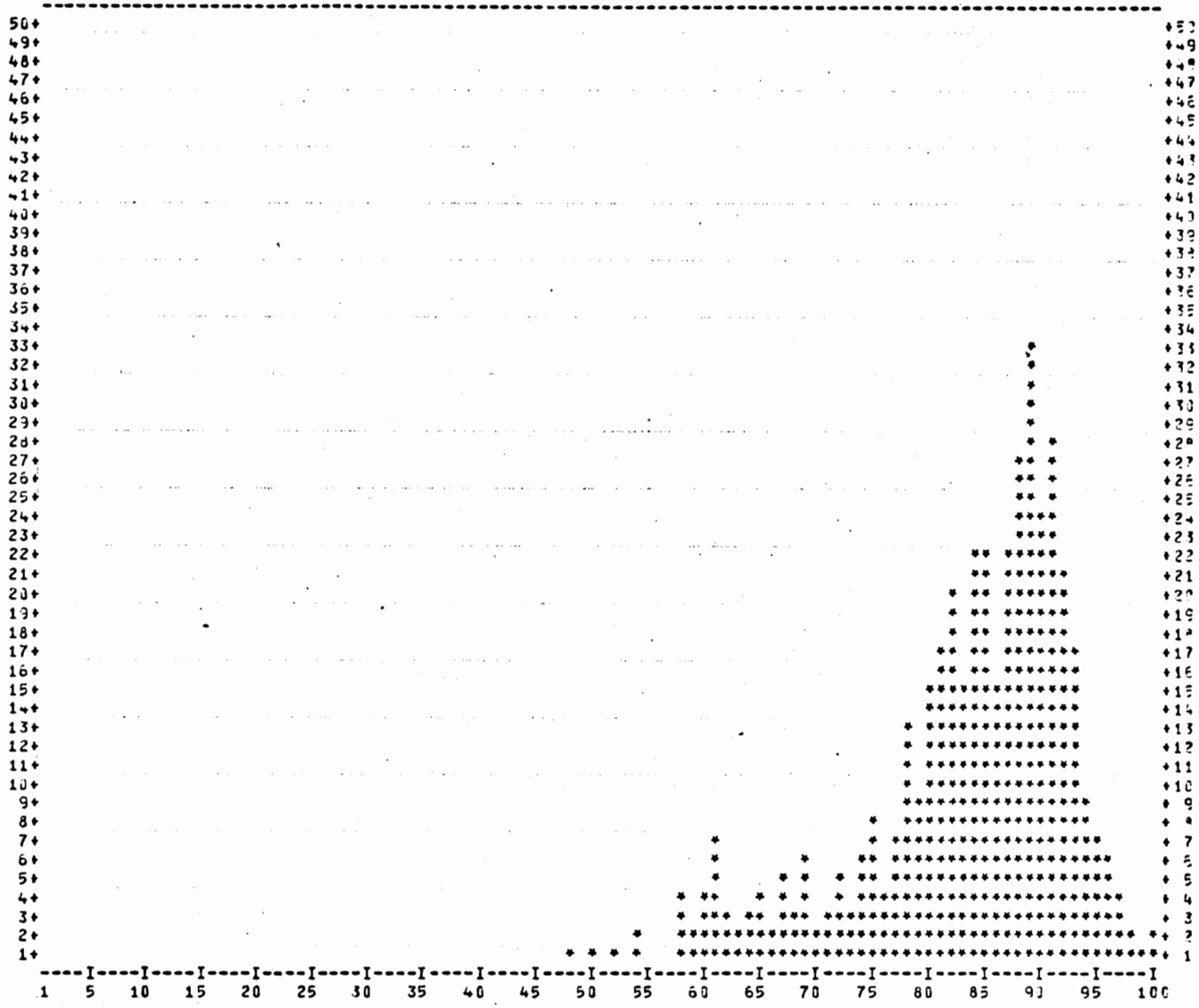


FIGURE 27. Length frequencies of California barracuda for December 1977.
Total No. Quarter 252 Mean Length Quarter 65.071 cm

LENGTH HISTOGRAM FOR YELLOWTAIL (SERIOLA DORSALIS)
CURING OCTOBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 2.0



THE X-AXIS = LENGTH (CENTIMETERS)

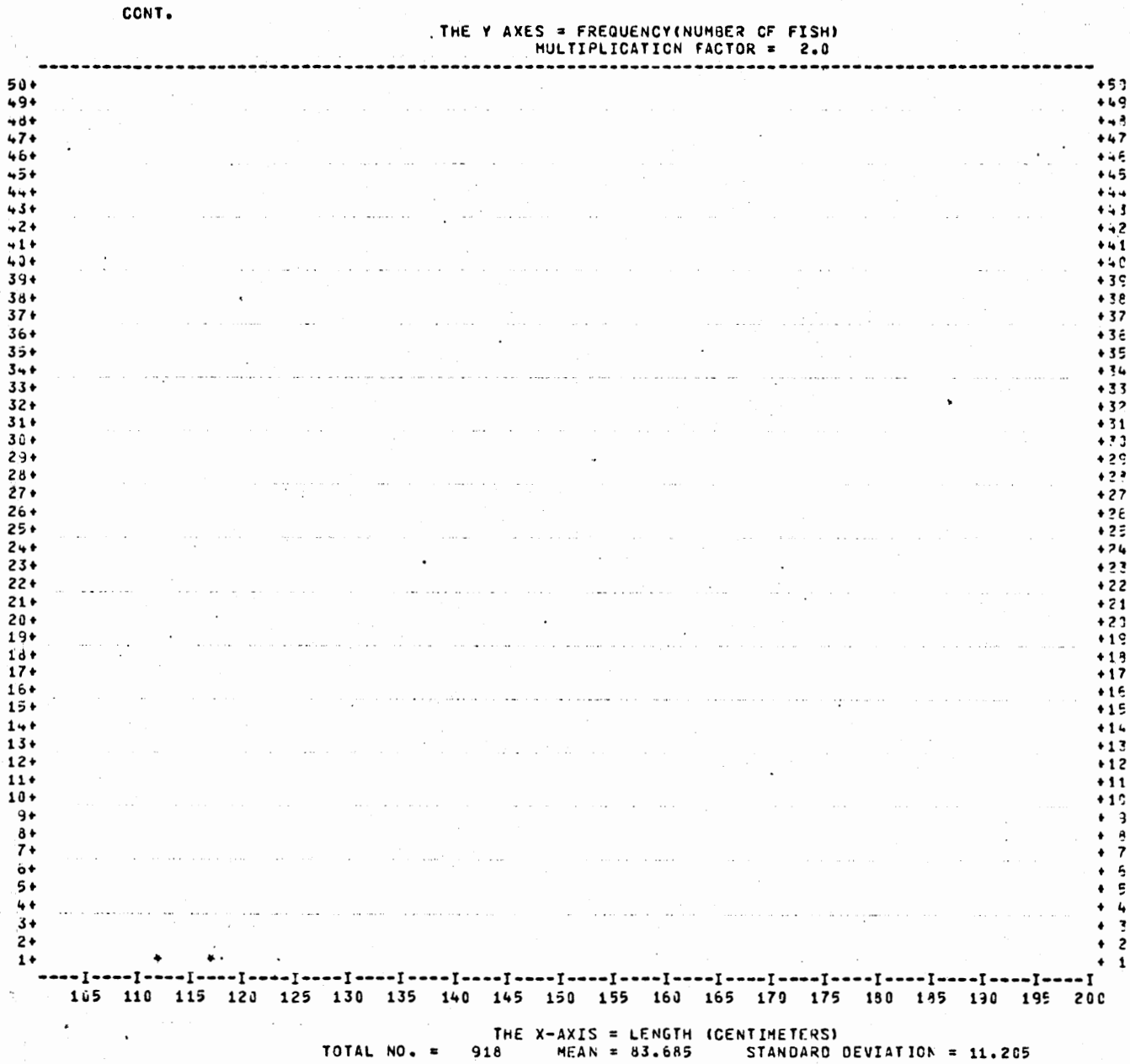
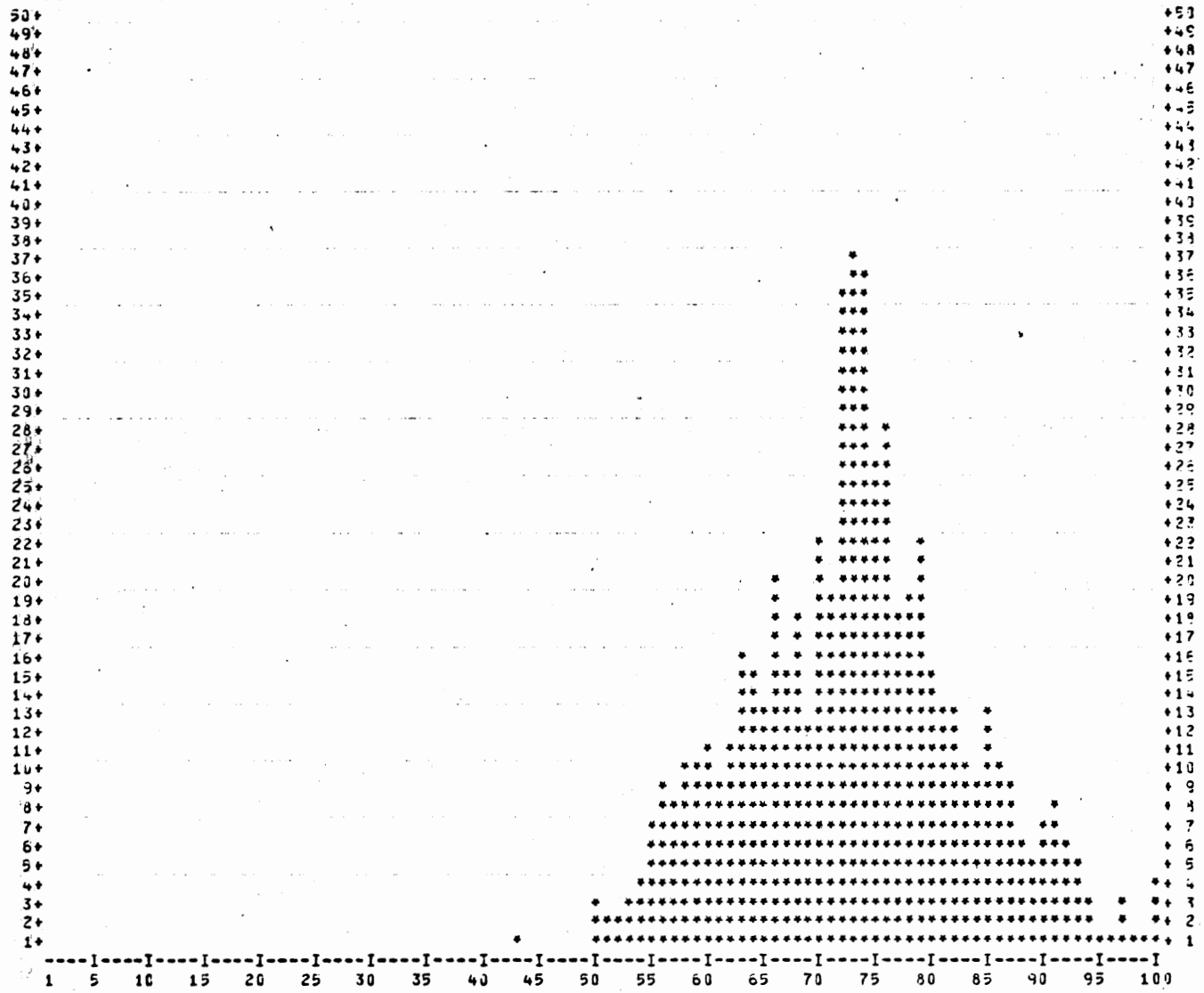


FIGURE 28. Length frequencies of yellowtail for October 1977.

LENGTH HISTOGRAM FOR YELLOWTAIL (SERIOLA DORSALIS)
DURING NOVEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 2.0



THE X-AXIS = LENGTH (CENTIMETERS)

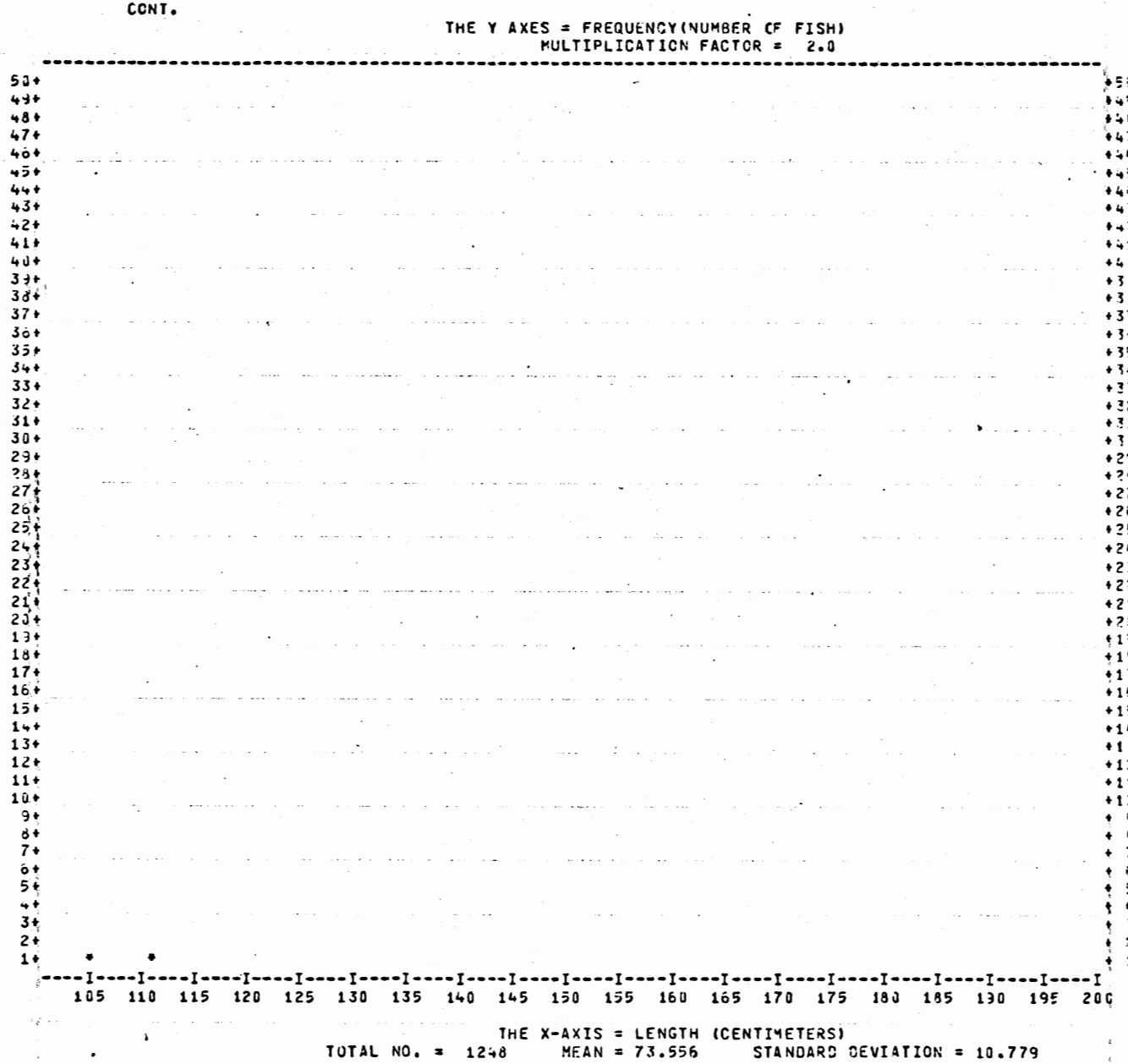
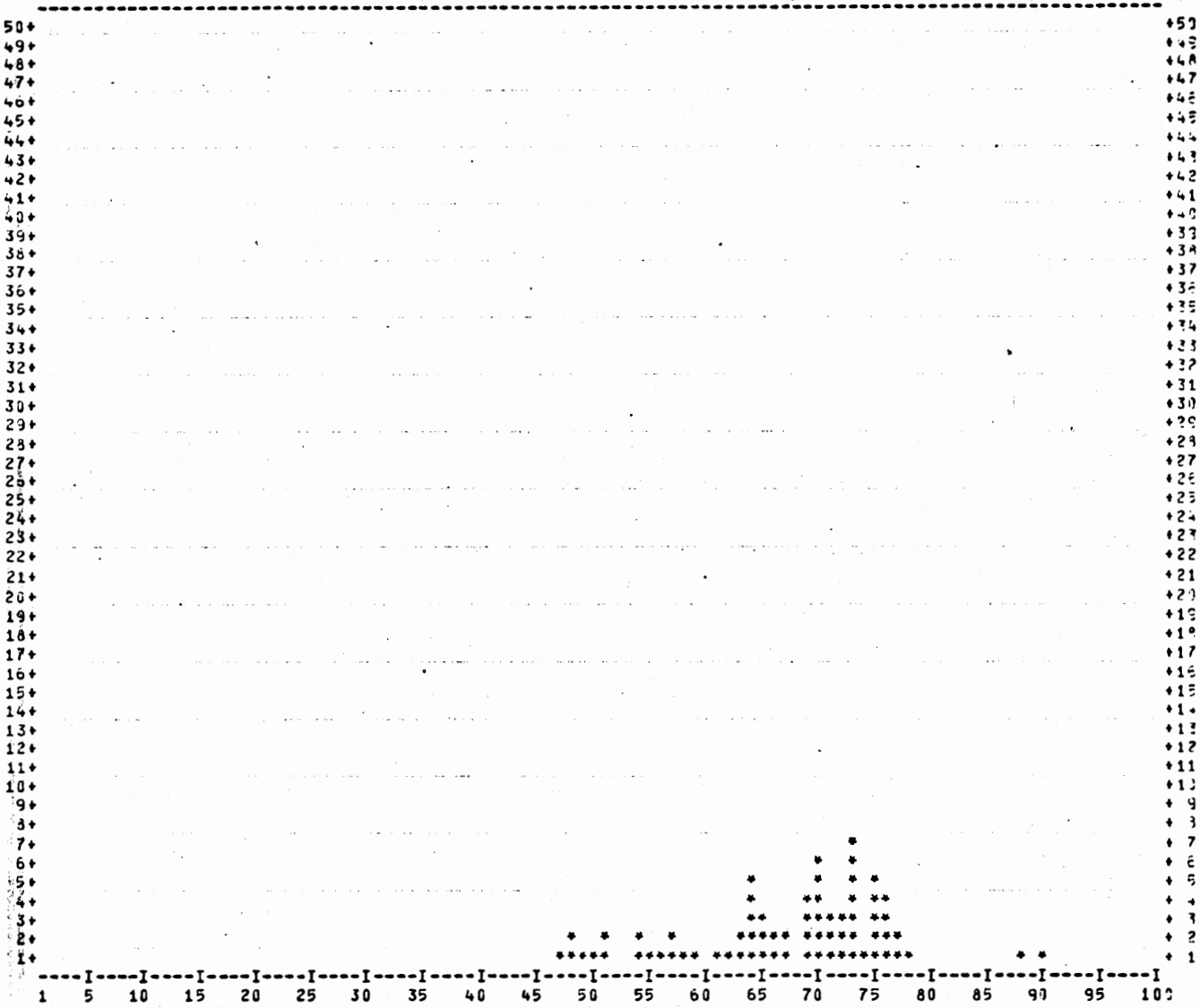


FIGURE 29. Length frequencies of yellowtail for November 1977.

LENGTH HISTOGRAM FOR YELLOWTAIL (SERIOLA DORSALIS)
DURING DECEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIFLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

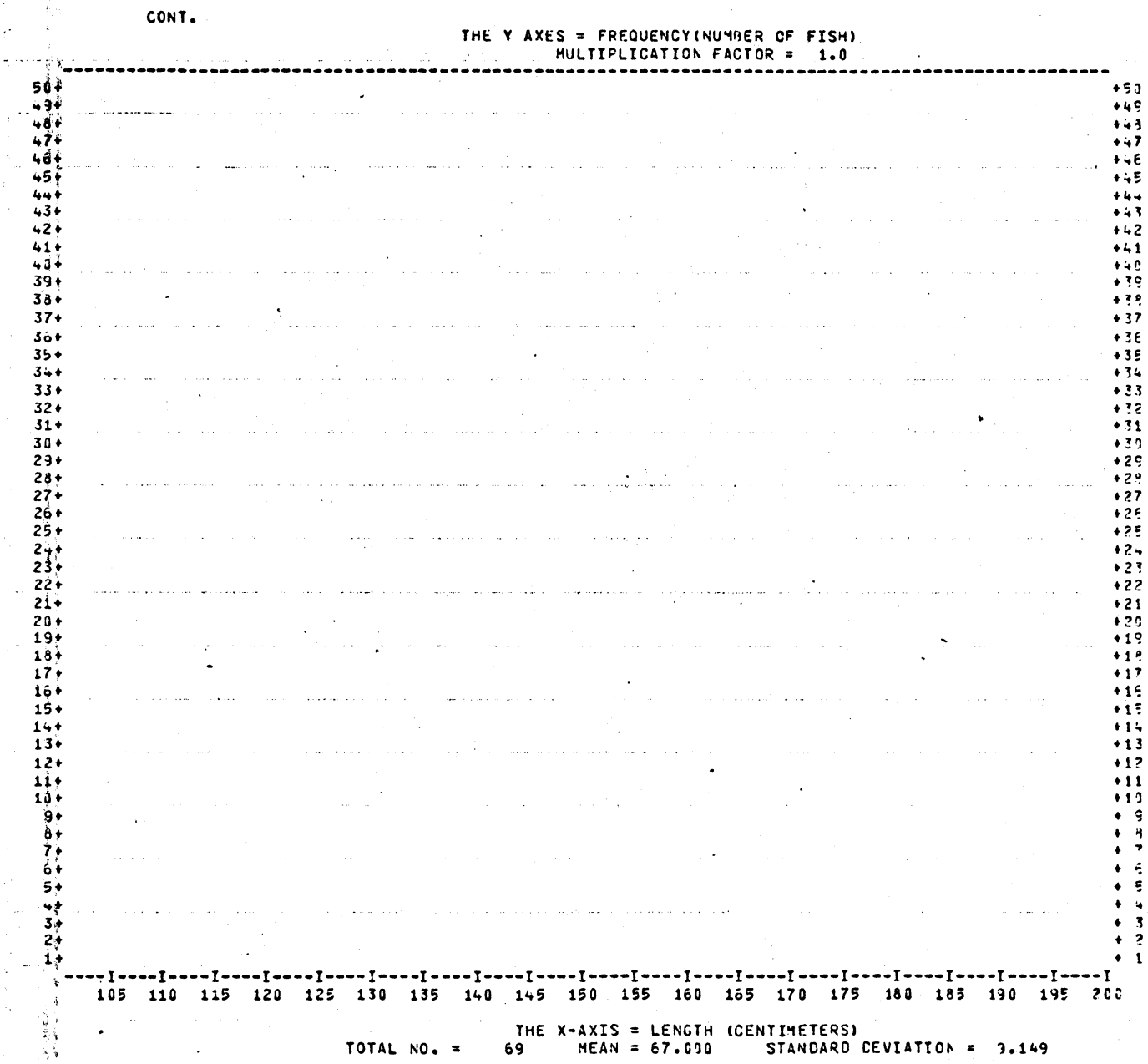
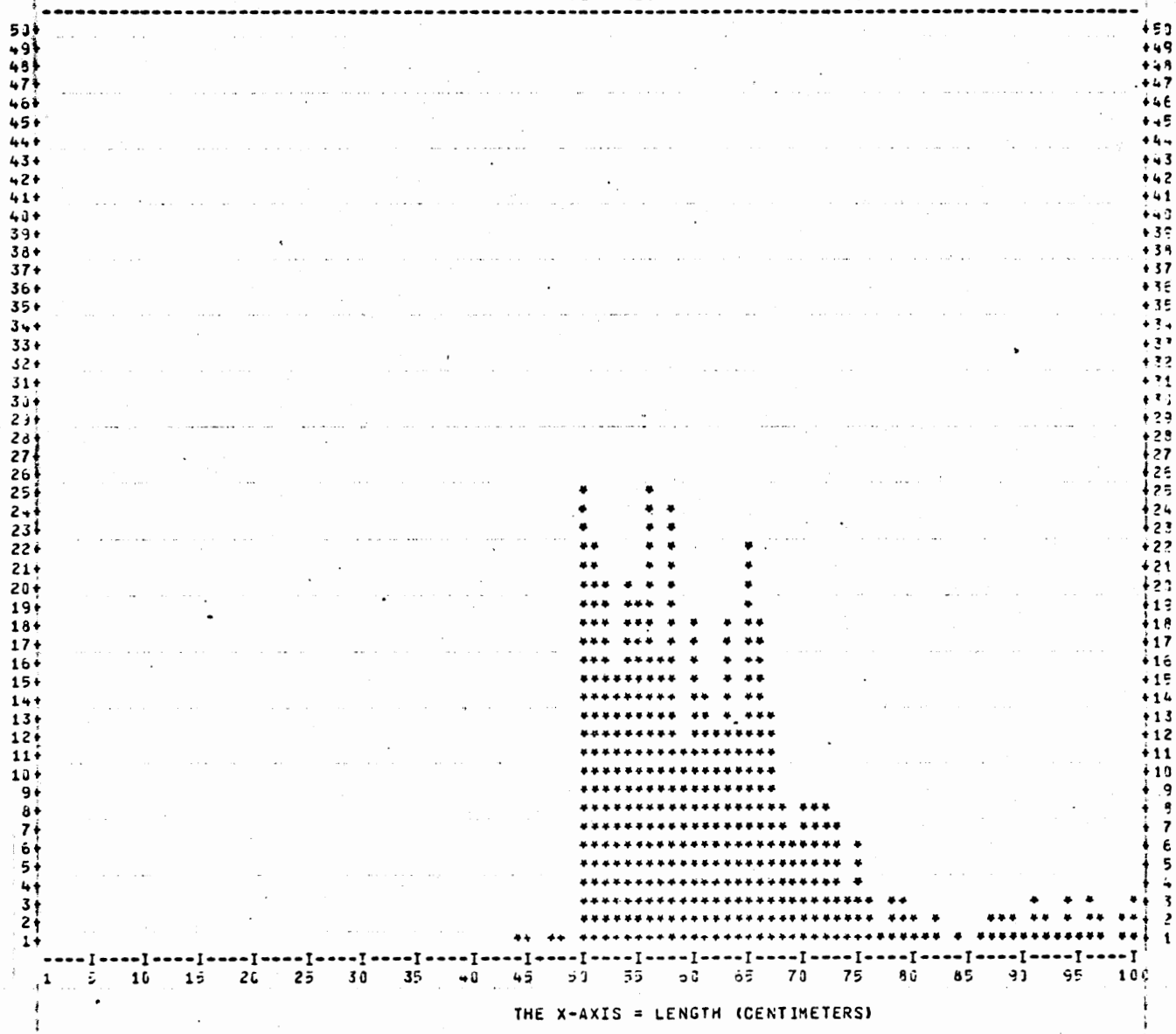


FIGURE 30. Length frequencies of yellowtail for December 1977.
Total No. Quarter 2,234 Mean Length Quarter 77.513 cm

LENGTH HISTOGRAM FOR YELLOWFIN TUNA (THUNNUS ALBACARES)
DURING OCTOBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



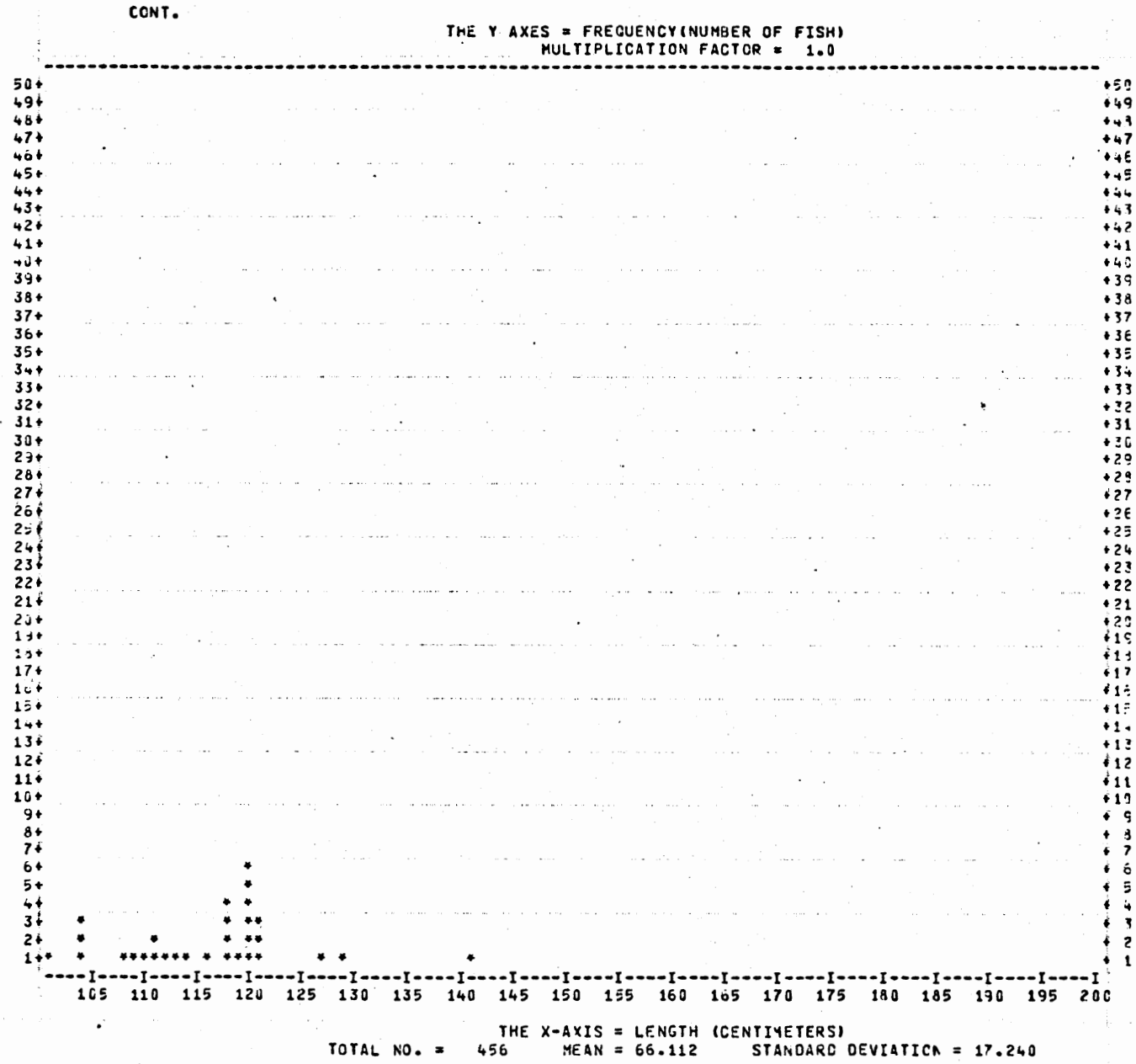
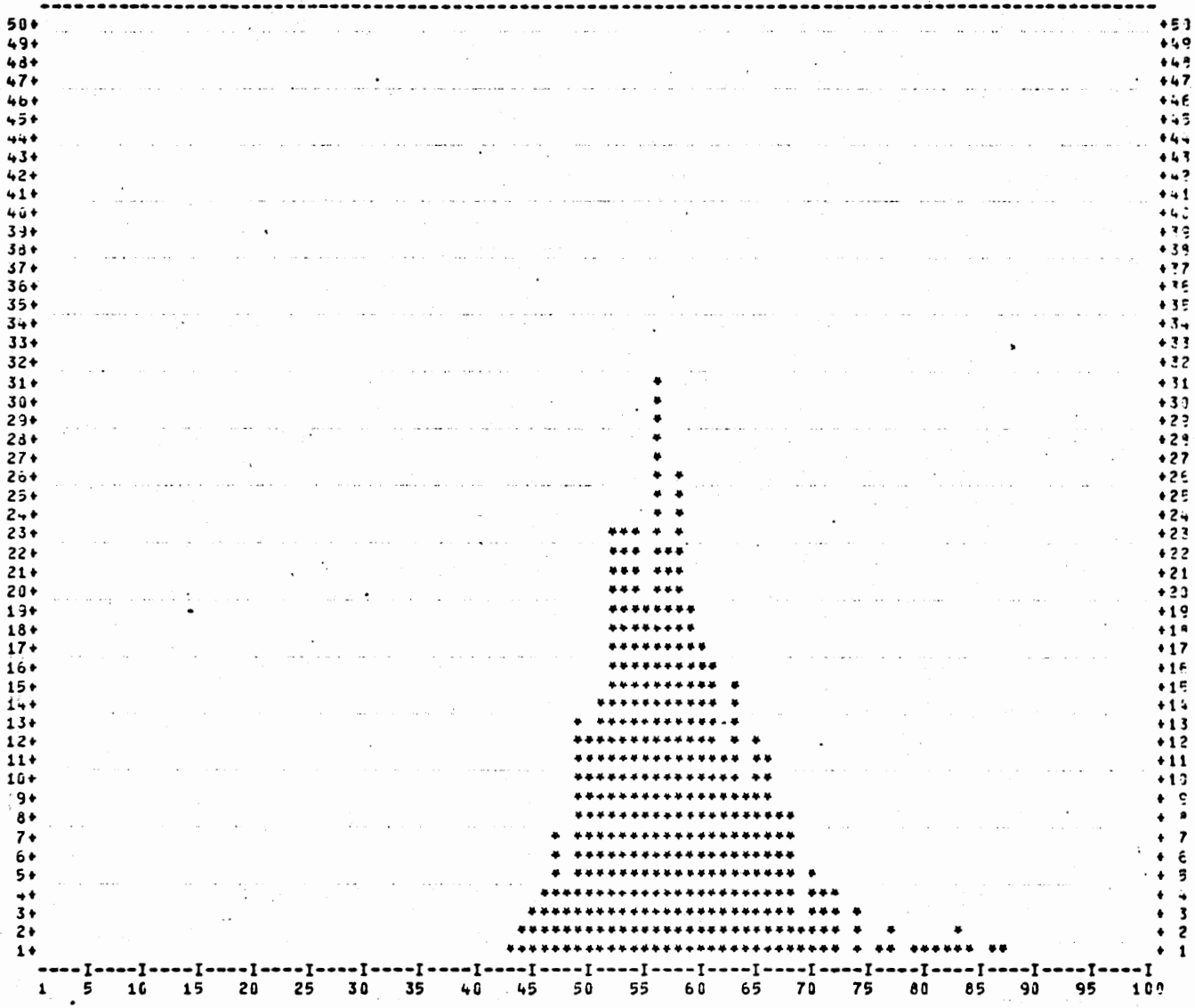


FIGURE 31. Length frequencies of yellowfin tuna for October 1977.

LENGTH HISTOGRAM FOR YELLOWFIN TUNA (THUNNUS ALBACARES)
DURING NOVEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 2.0



THE X-AXIS = LENGTH (CENTIMETERS)

CONT.

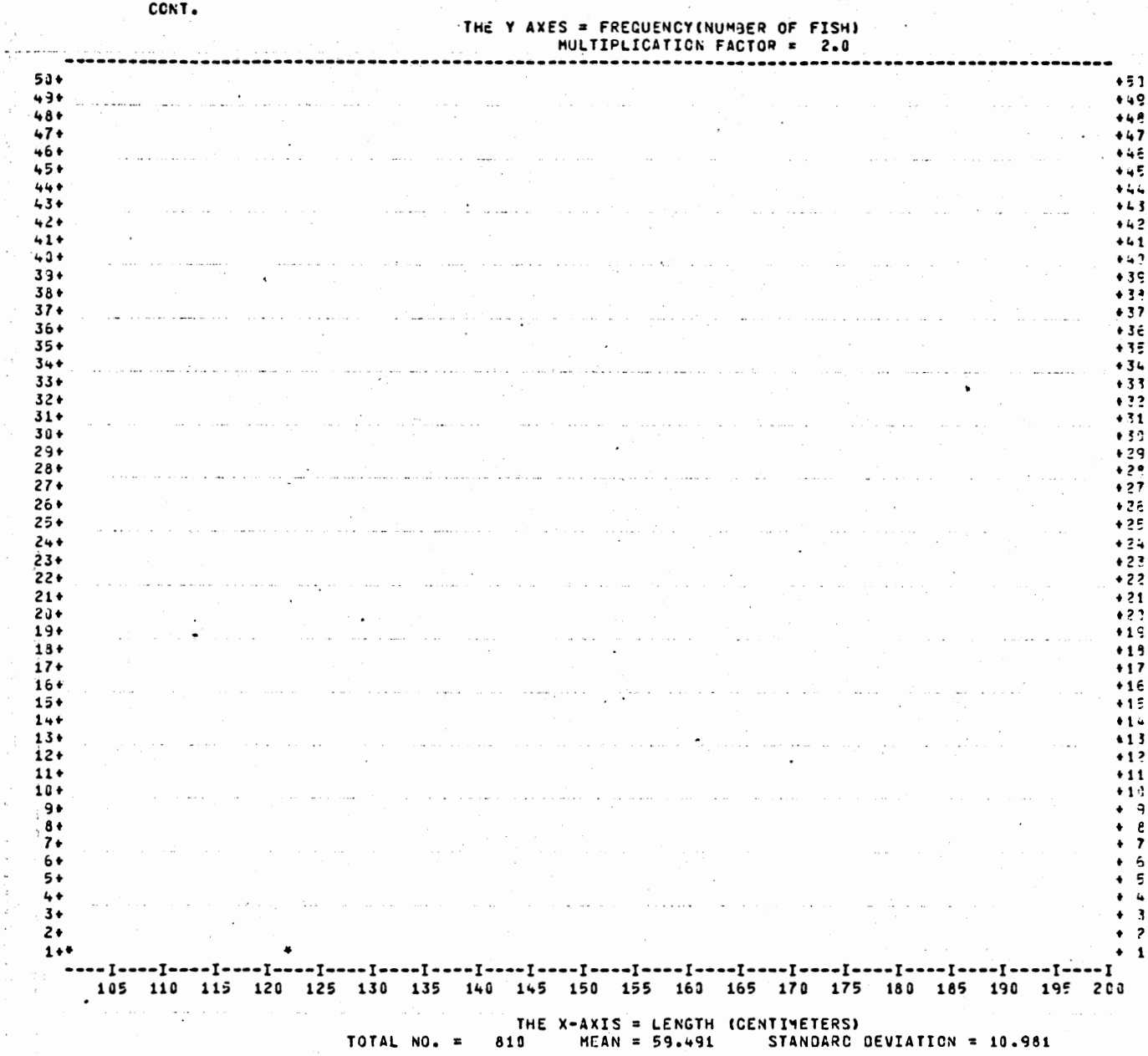
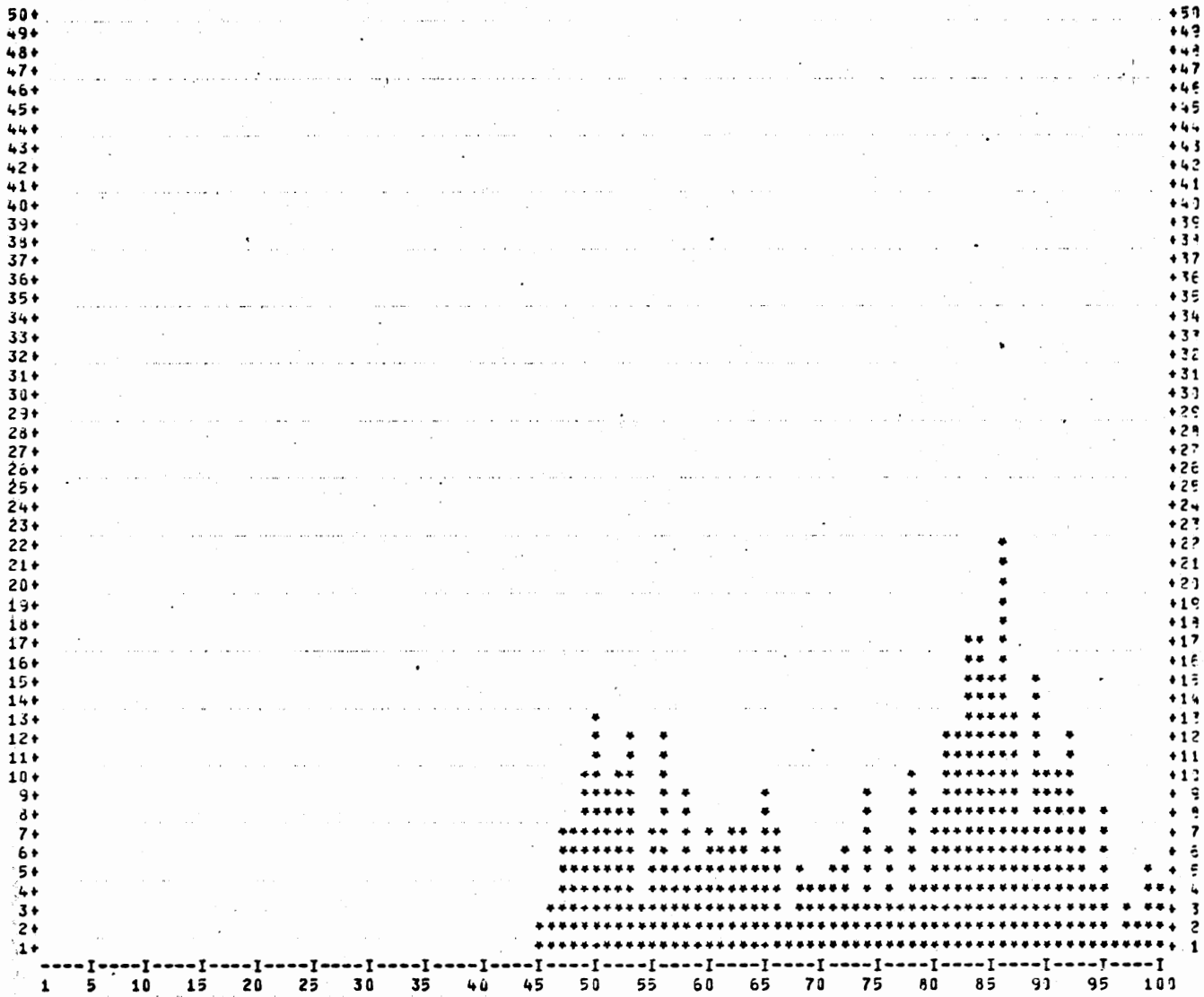


FIGURE 32. Length frequencies of yellowfin tuna for November 1977.

LENGTH HISTOGRAM FOR YELLOWFIN TUNA (THUNNUS ALBACARES)
DURING DECEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

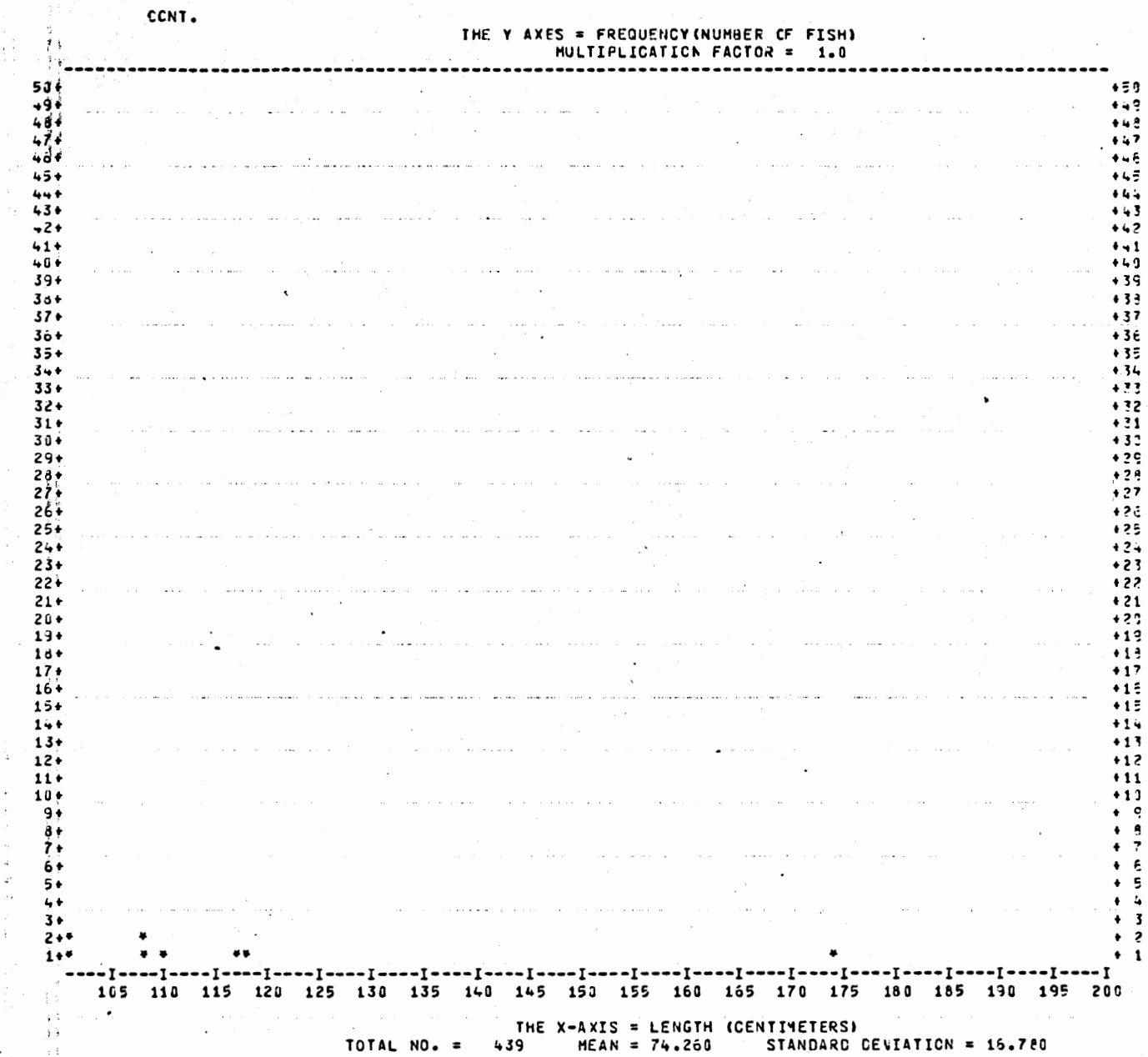
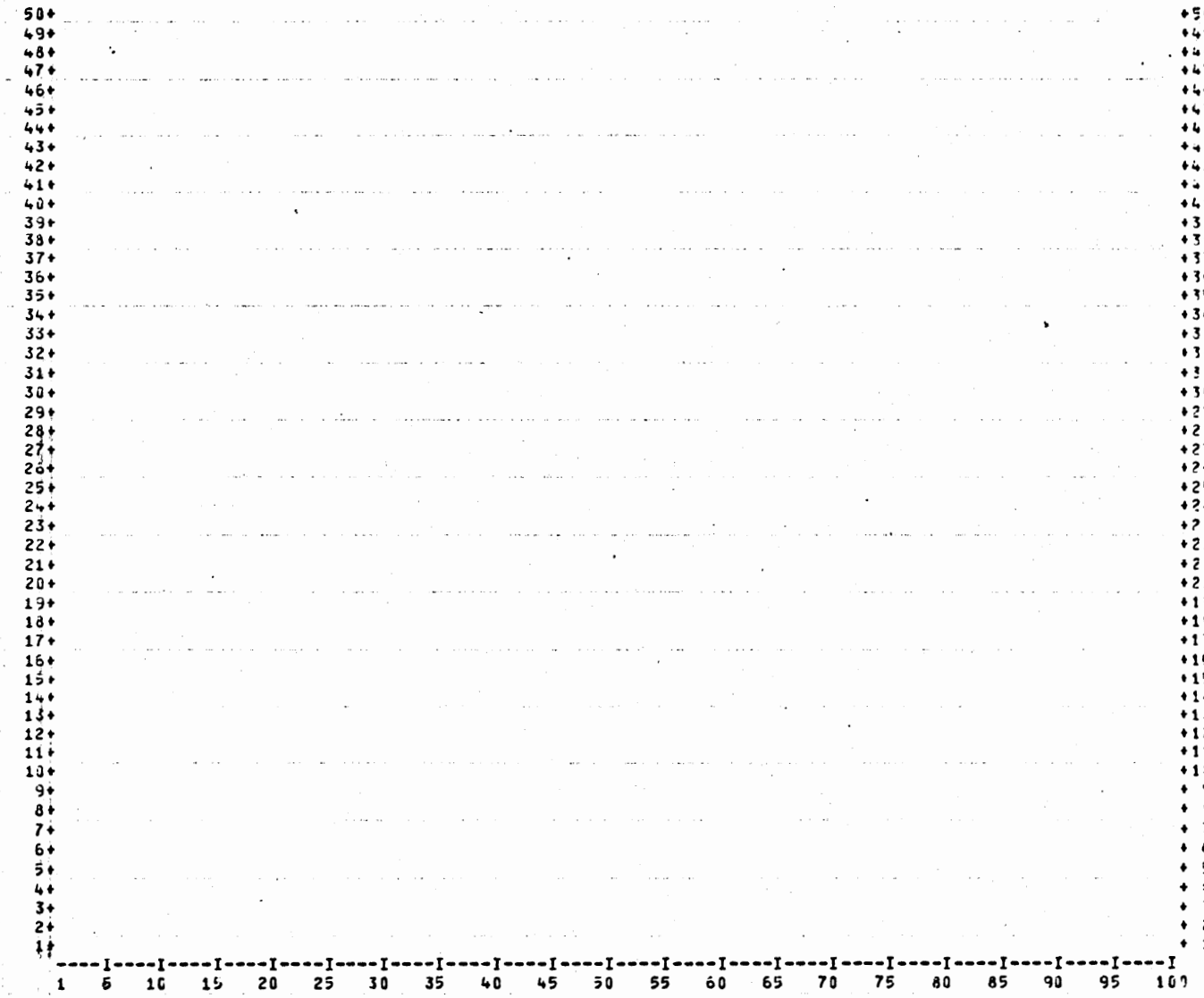


FIGURE 33. Length frequencies of yellowfin tuna for December 1977.
Total No. Quarter 1,704 Mean Length Quarter 65.064 cm

LENGTH HISTOGRAM FOR WAHOO (ACANTHOCYBIUM SOLANDERI).
DURING OCTOBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

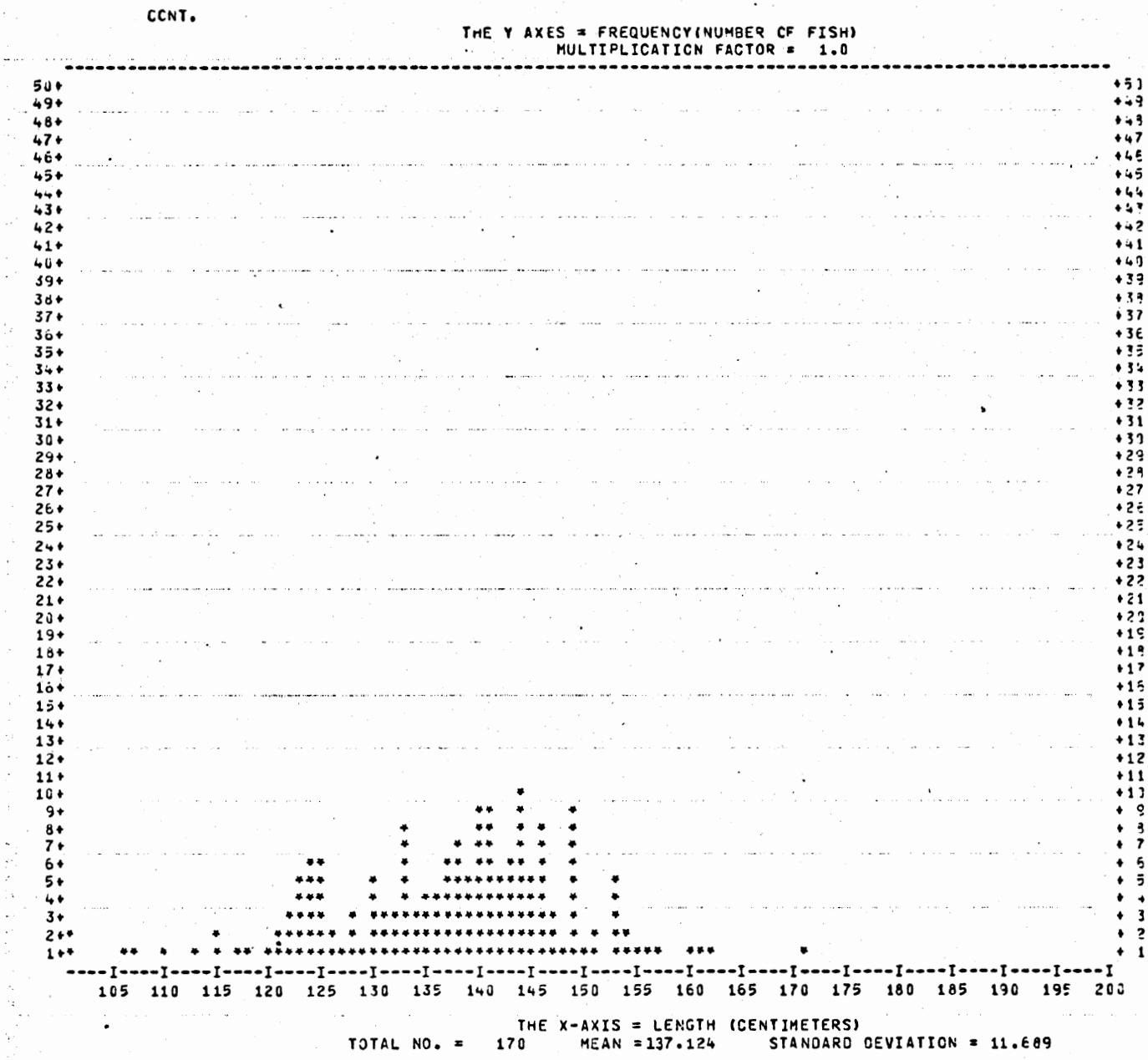
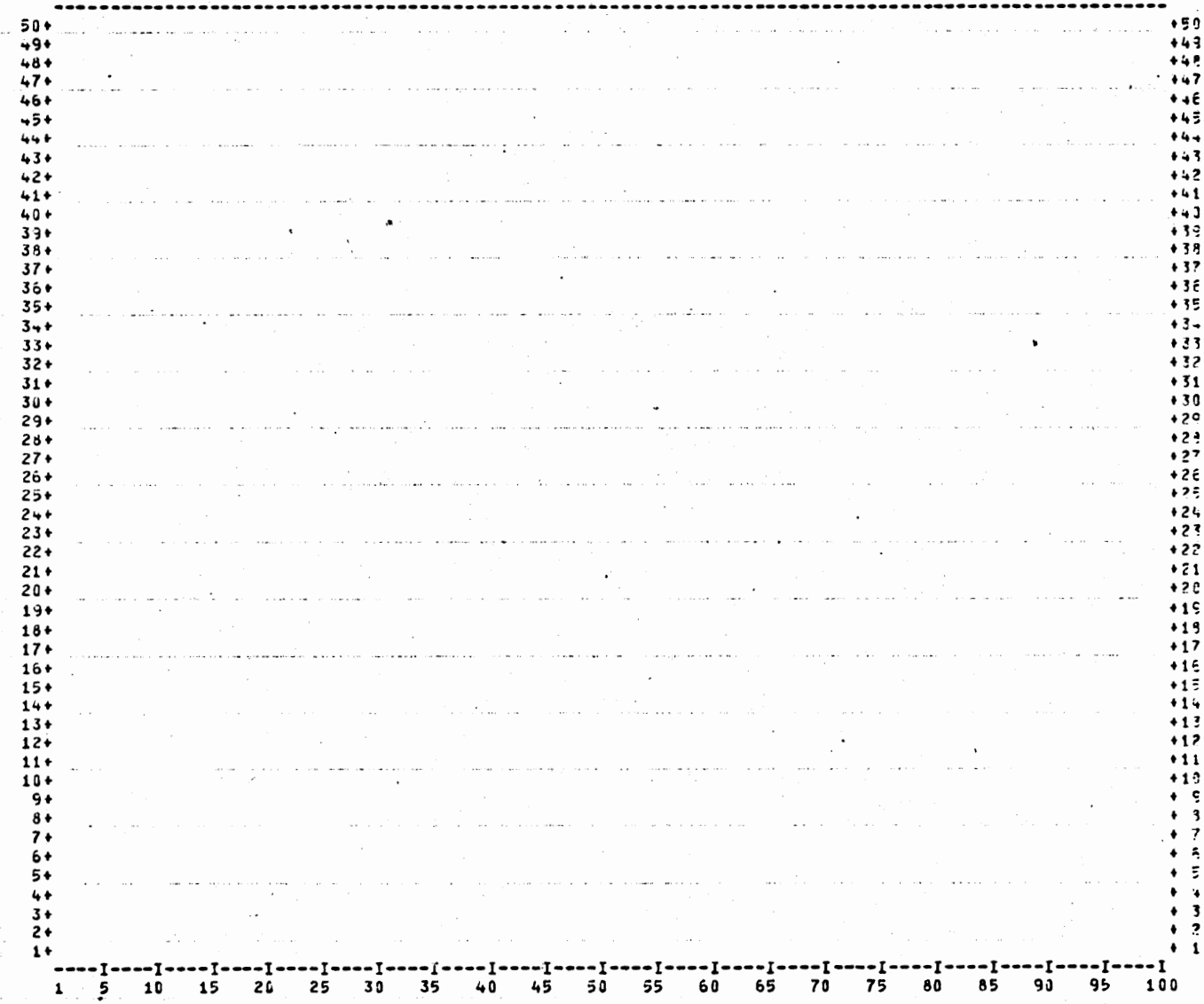


FIGURE 34. Length frequencies of wahoo for October 1977.

LENGTH HISTOGRAM FOR WAHOO (ACANTHOCYBIUM SOLANDERI)
DURING NOVEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

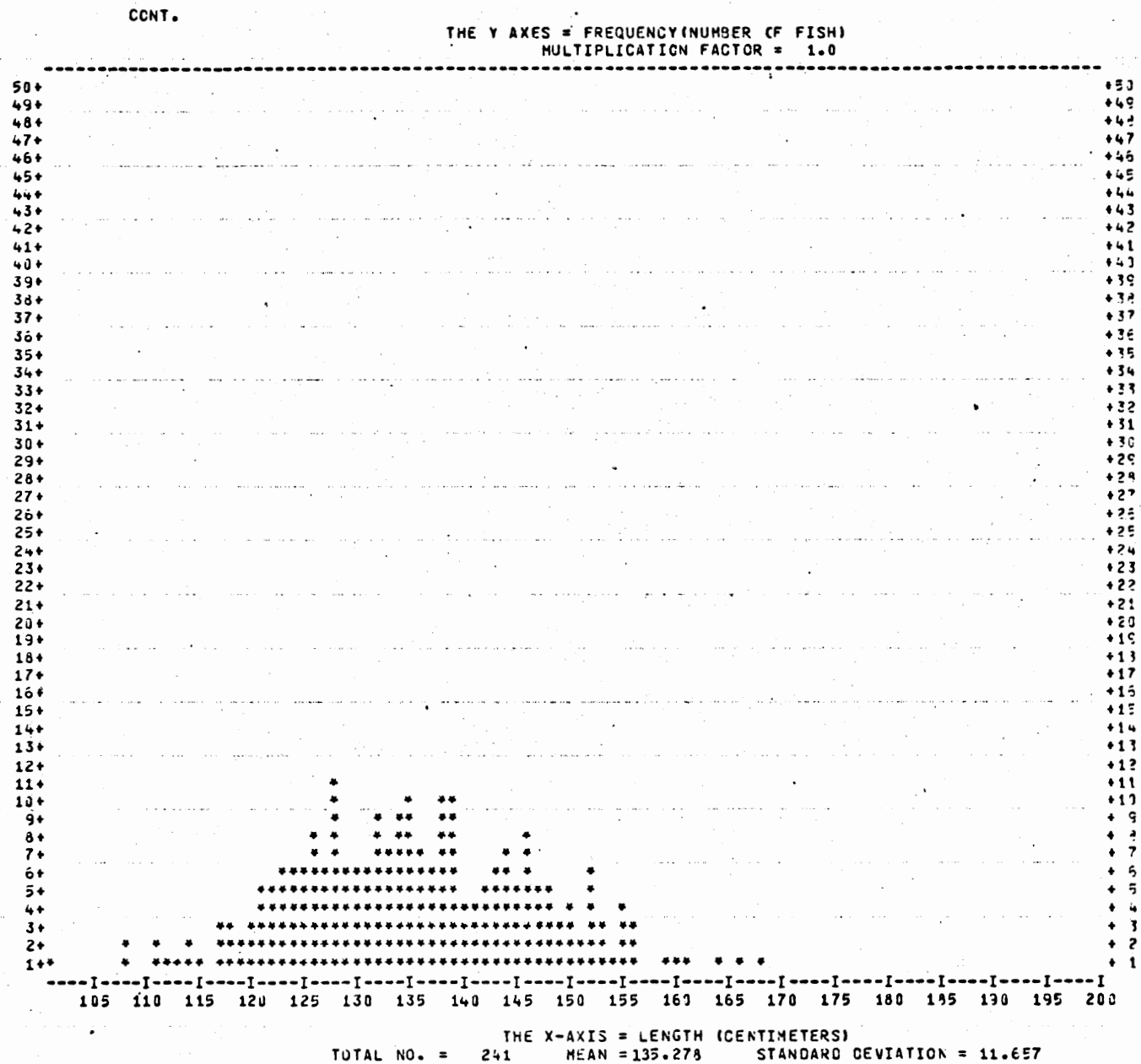
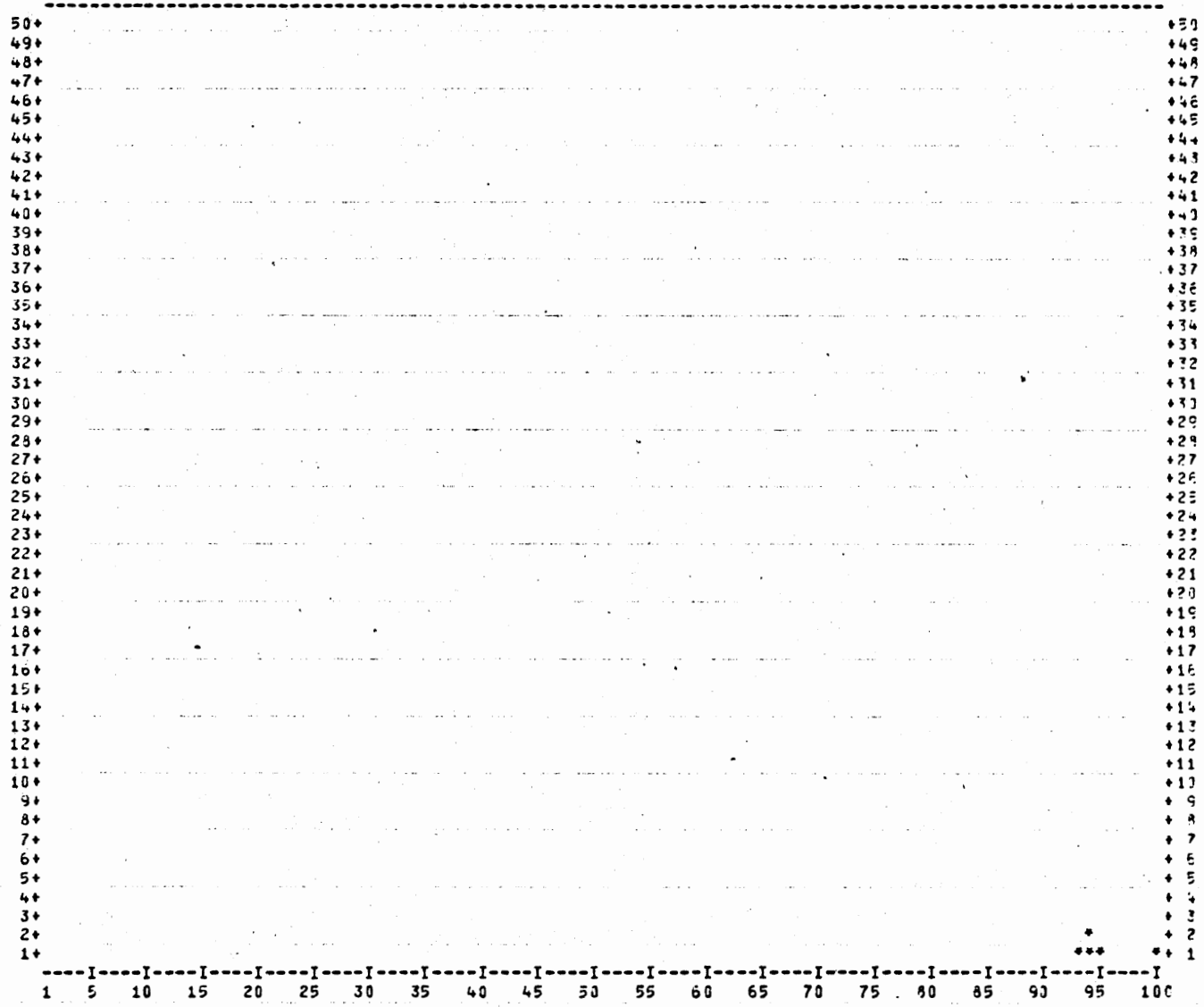


FIGURE 35. Length frequencies of wahoo for November 1977.

LENGTH HISTOGRAM FOR WAHOO (ACANTHOCYBIUM SOLANDERI)
DURING DECEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

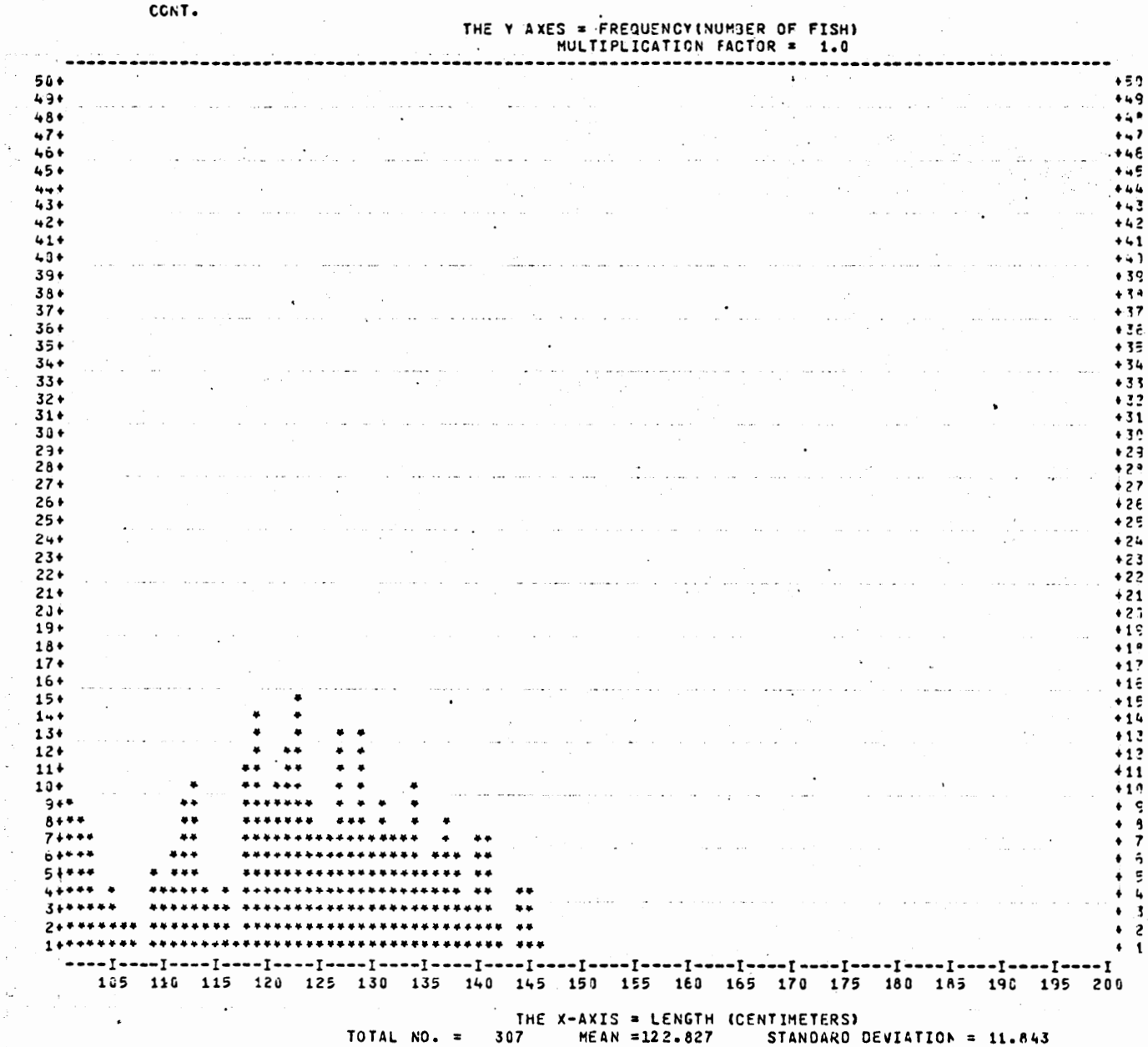
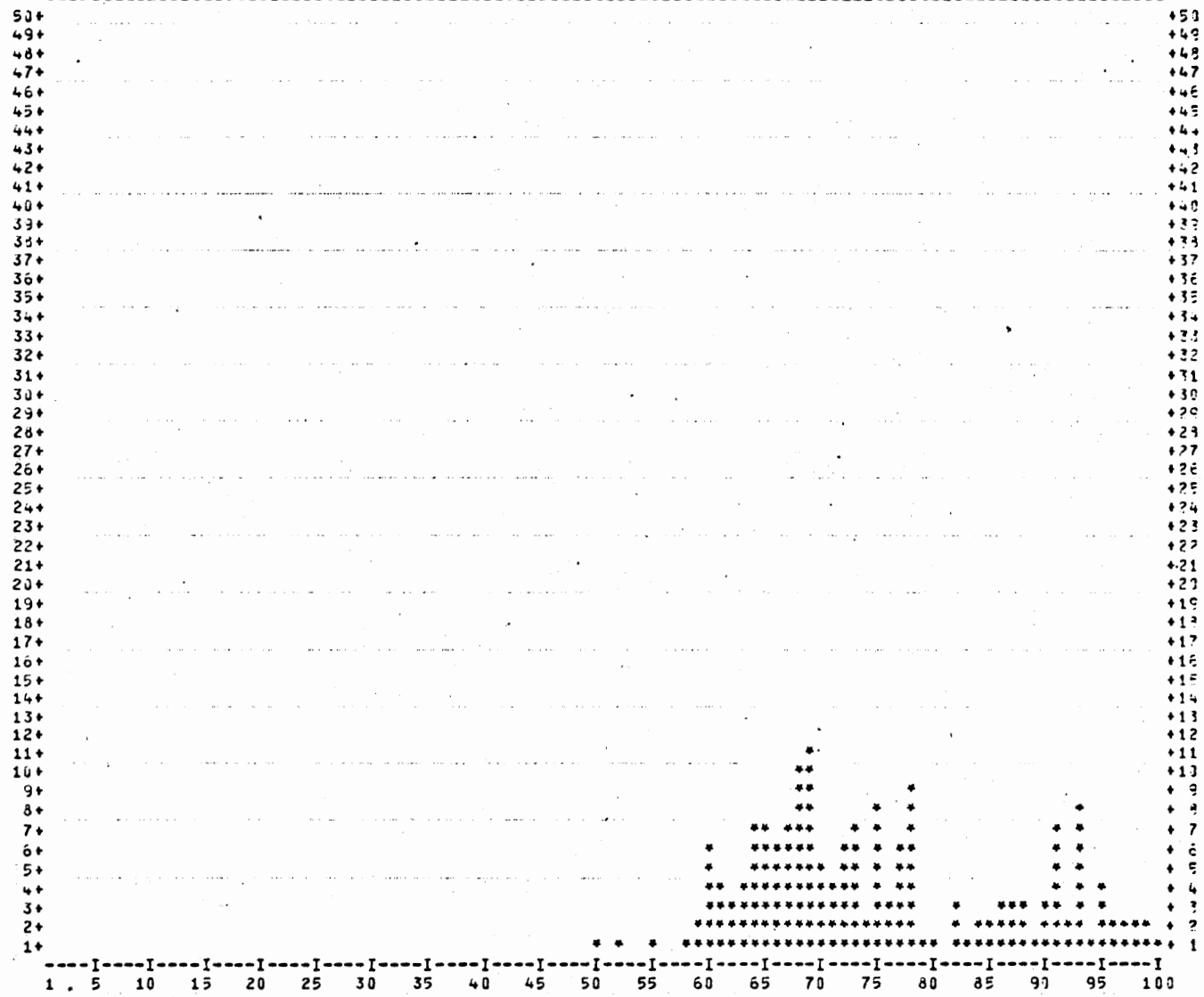


FIGURE 36. Length frequencies of wahoo for December 1977.
Total No. Quarter 717 Mean Length Quarter 130.391 cm

LENGTH HISTOGRAM FOR DOLPHINFISH (CORYPHAENA HIPPURUS)
DURING OCTOBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

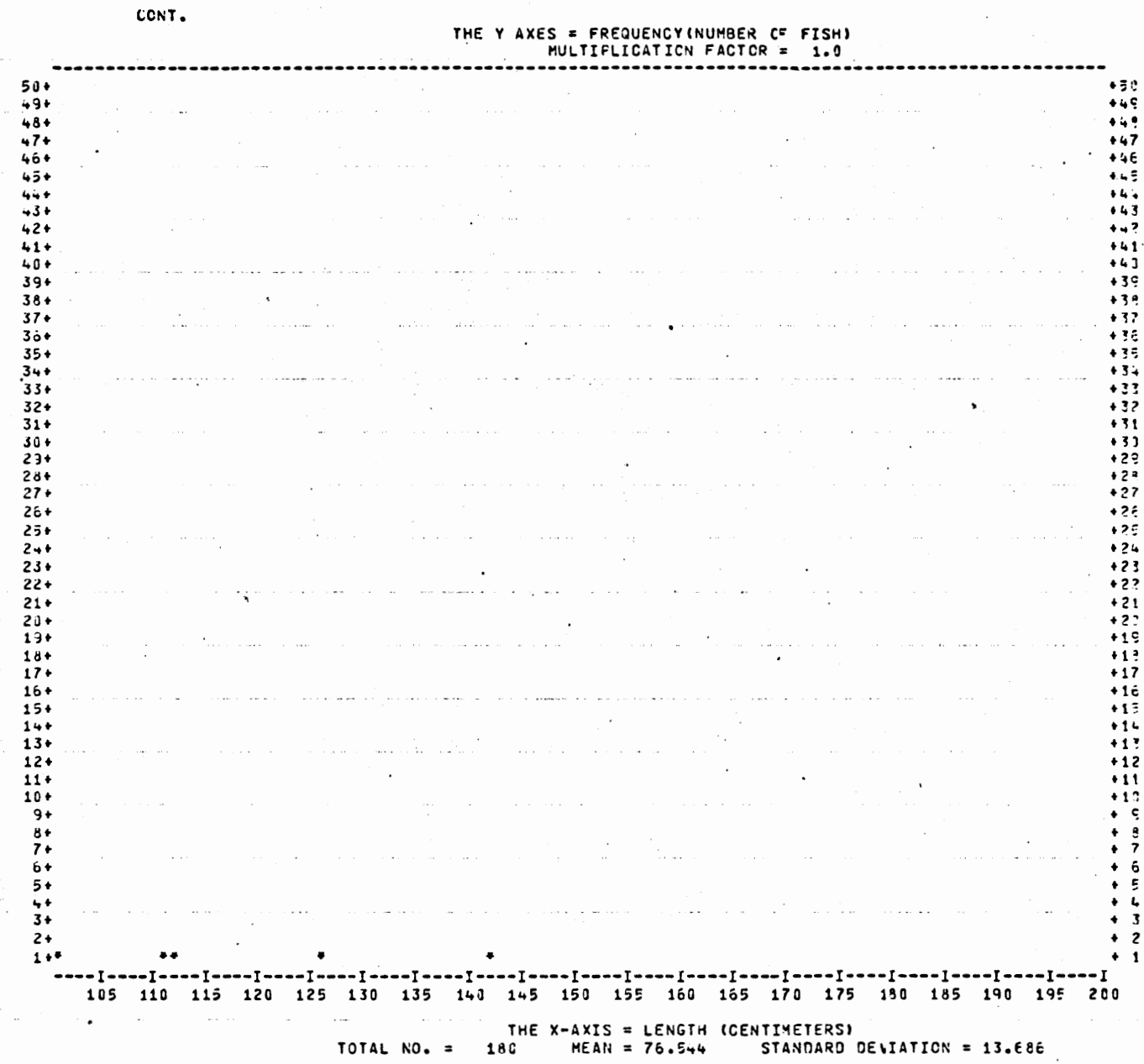
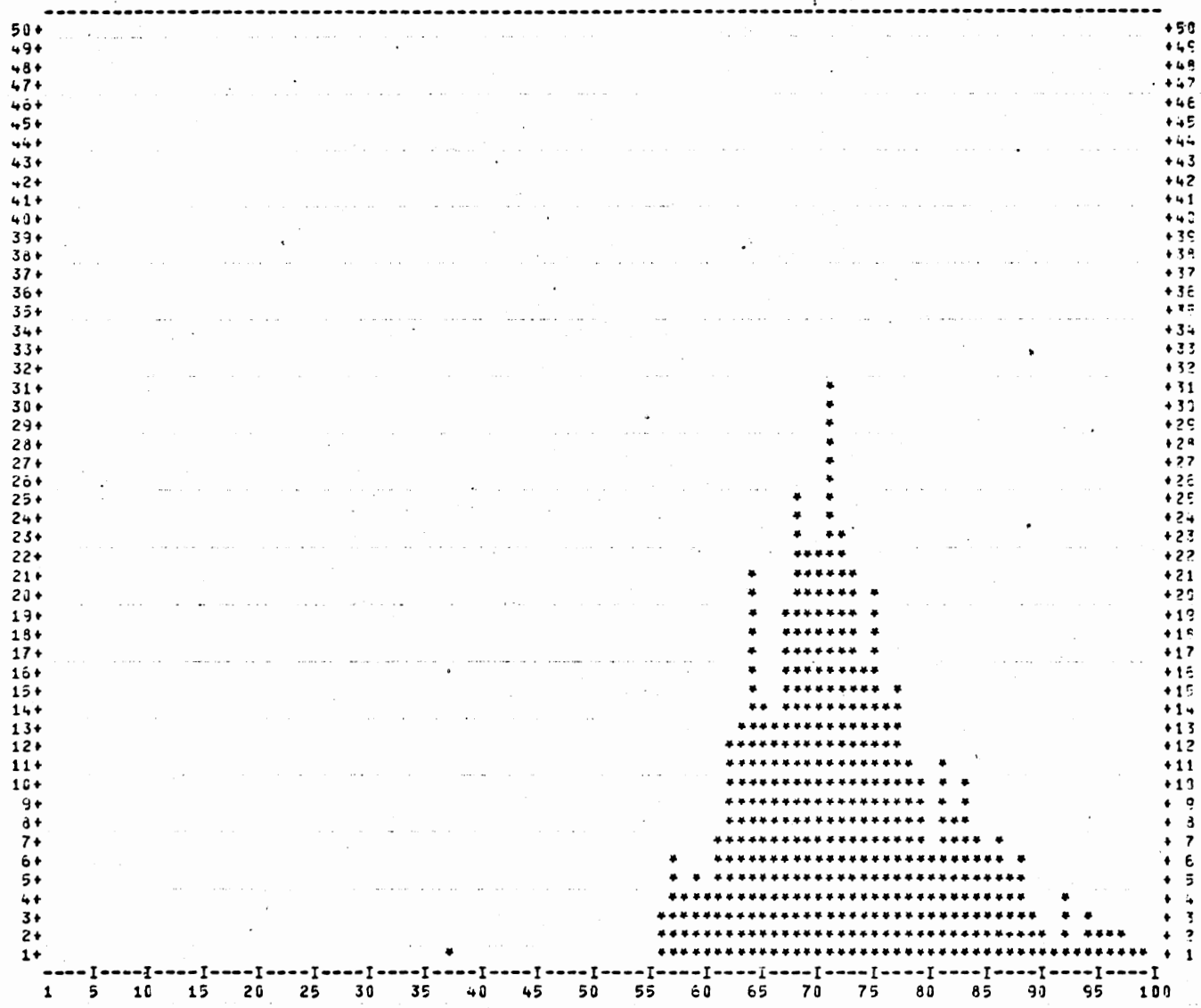


FIGURE 37. Length frequencies of dolphinfish for October 1977.

LENGTH HISTOGRAM FOR DOLPHINFISH (CORYPHAENA HIPPURUS)
DURING NOVEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 2.0



THE X-AXIS = LENGTH (CENTIMETERS)

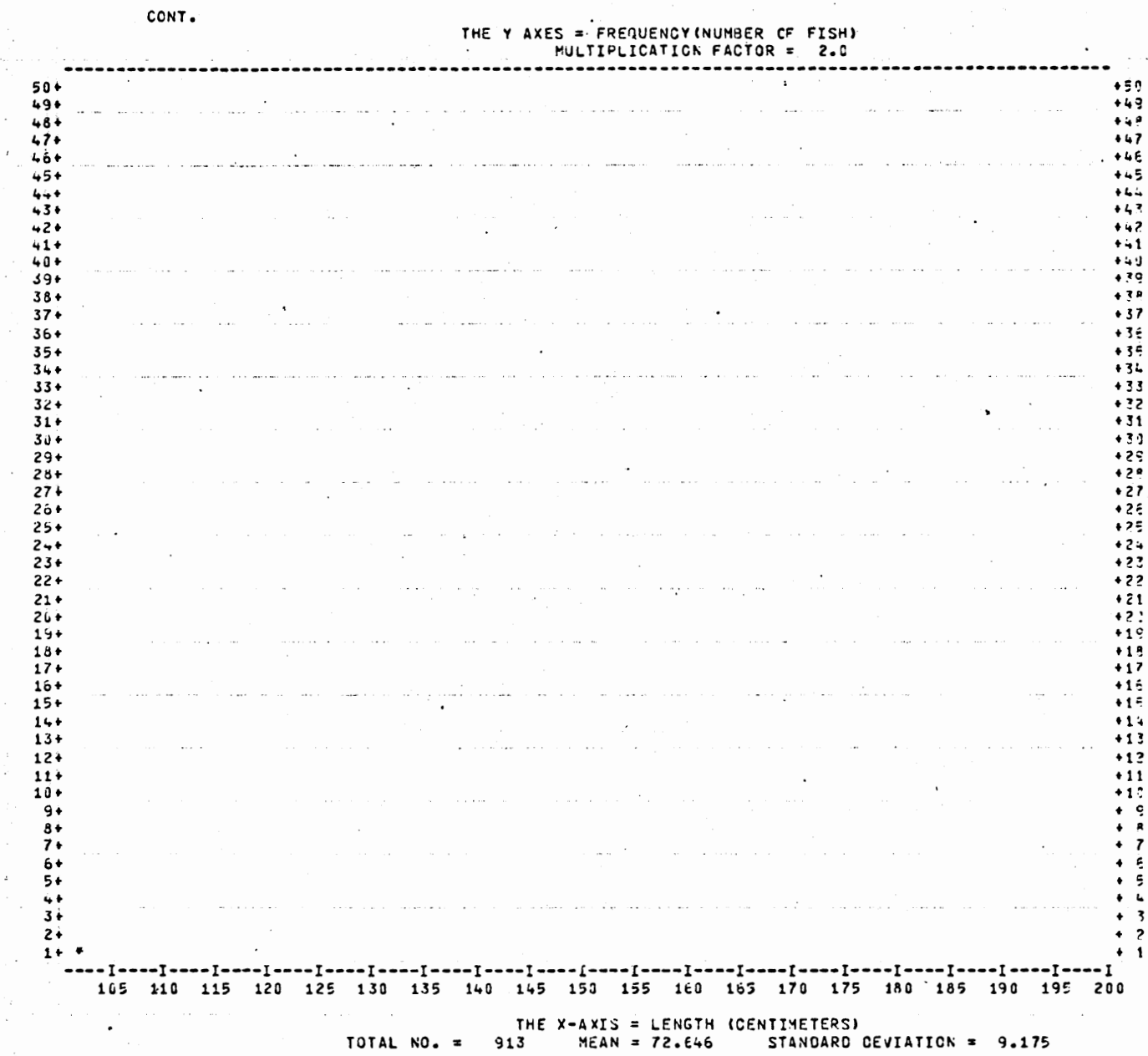
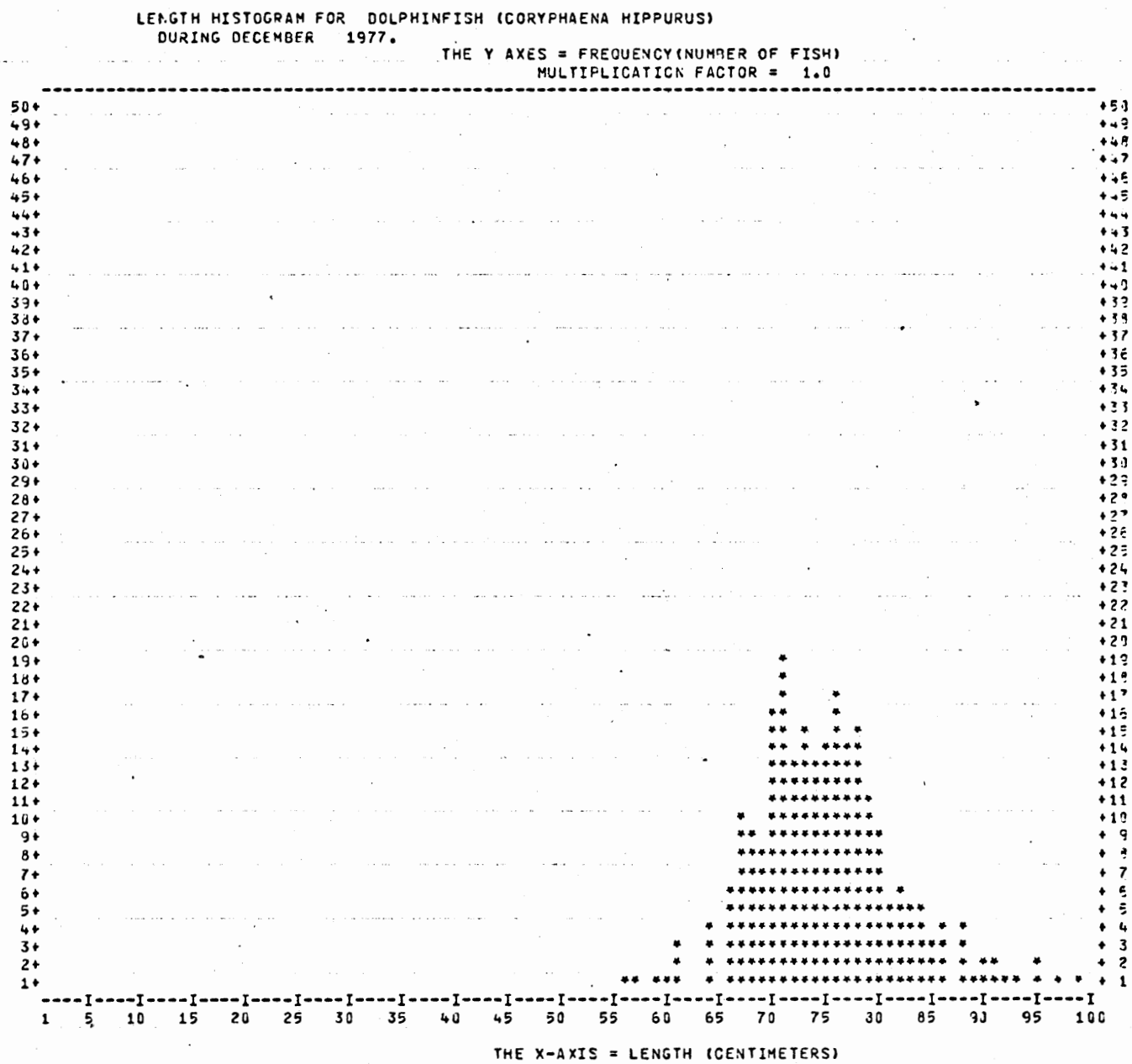


FIGURE 38. Length frequencies of dolphinfish for November 1977.


LENGTH HISTOGRAM FOR DOLPHINFISH (CORYPHAENA HIPPURUS)
DURING DECEMBER 1977.
THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0
THE X-AXIS = LENGTH (CENTIMETERS)

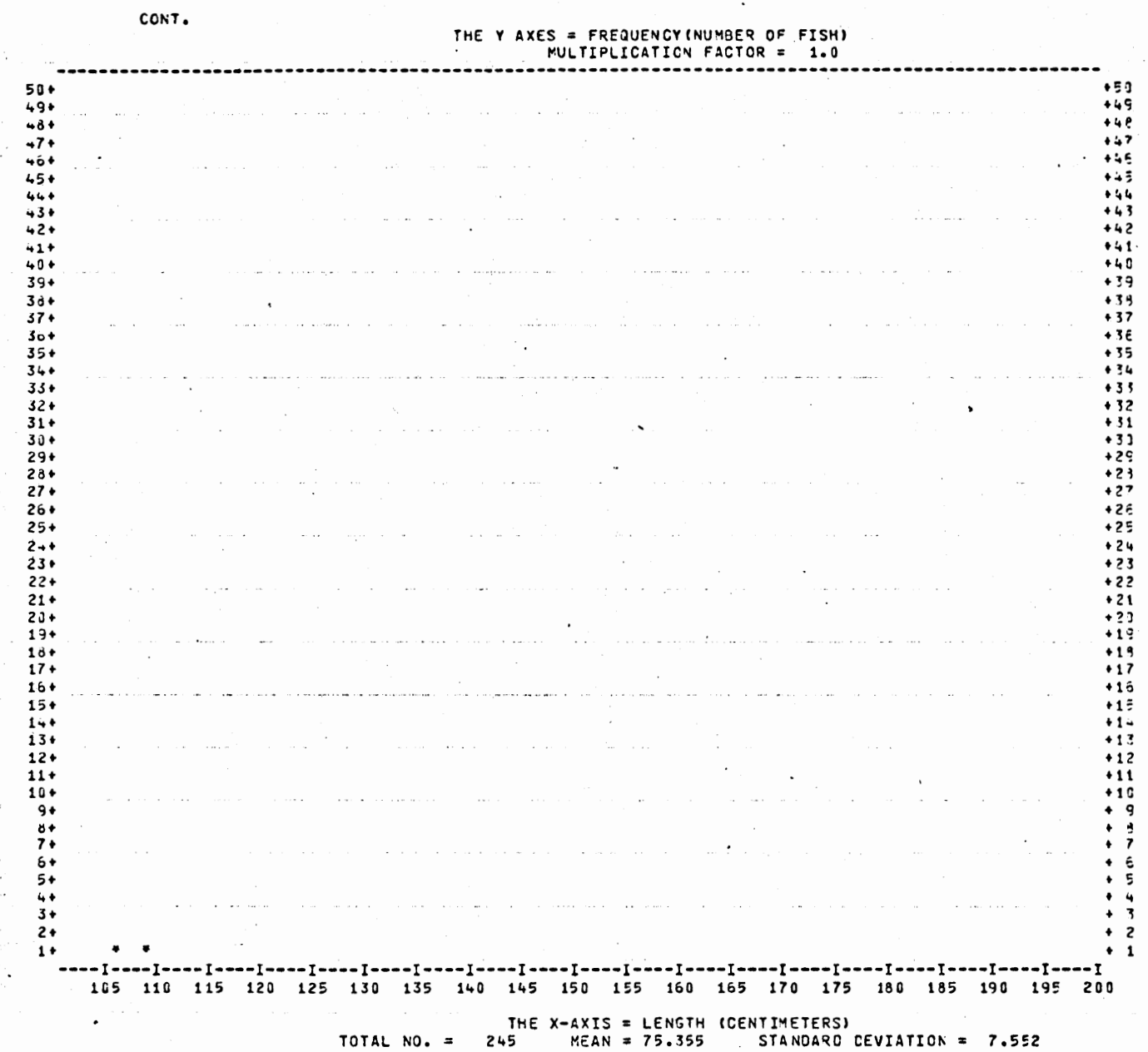
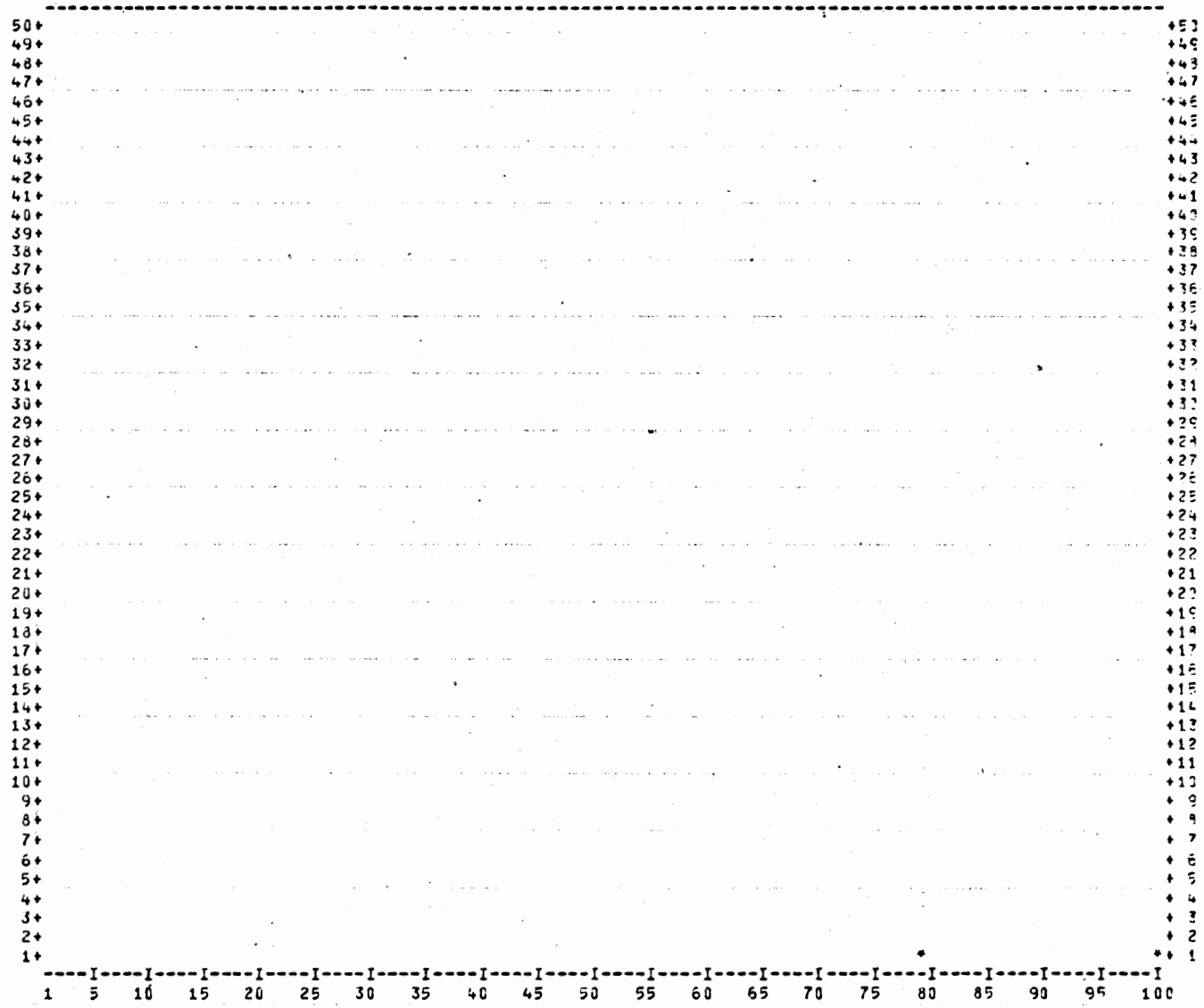


FIGURE 39. Length frequencies of dolphinfish for December 1977.
Total No. Quarter 1,337 Mean Length Quarter 73.667 cm

LENGTH HISTOGRAM FOR GIANT SEA BASS (STERECLEPIS GIGAS)
DURING OCTOBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

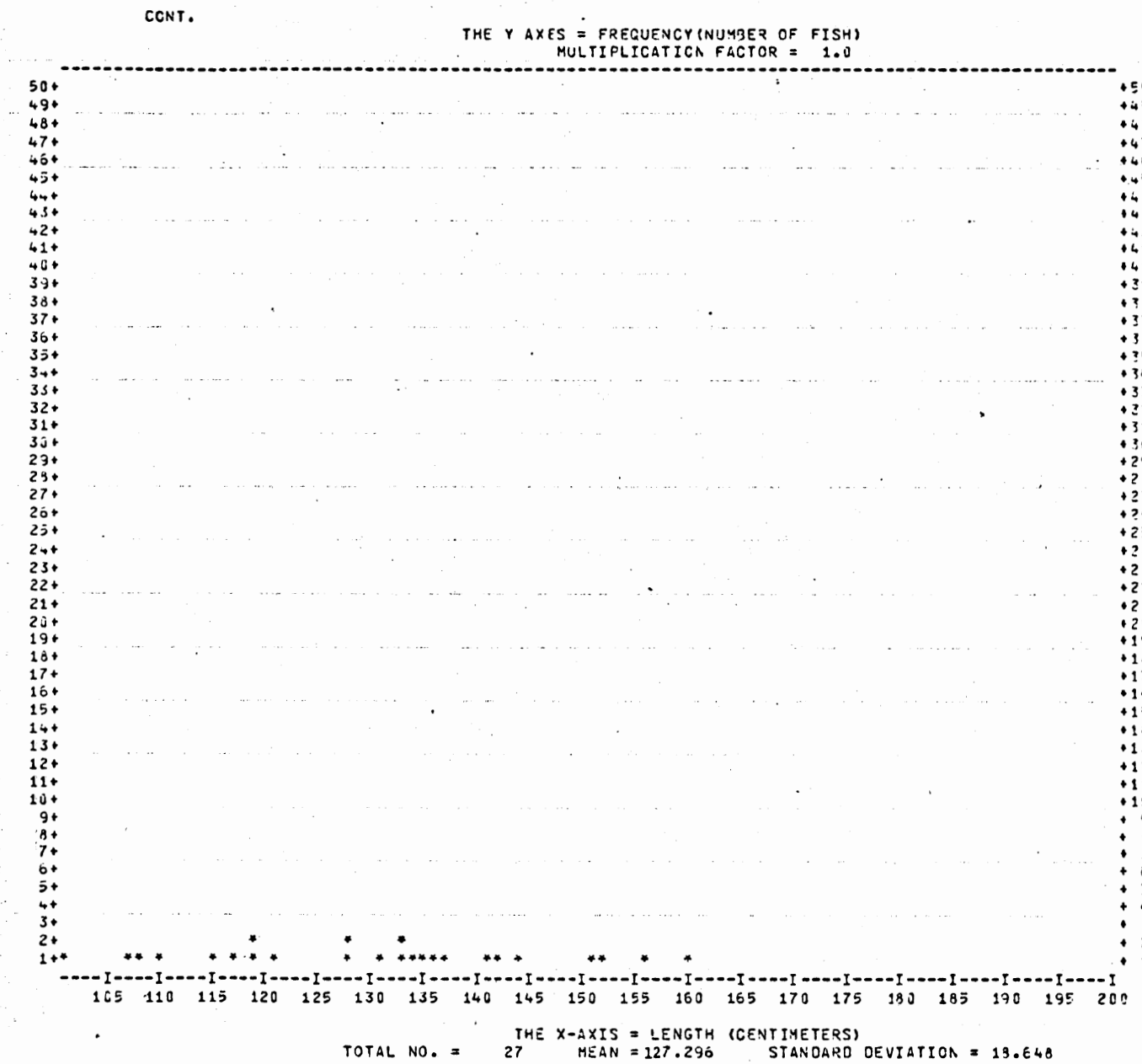
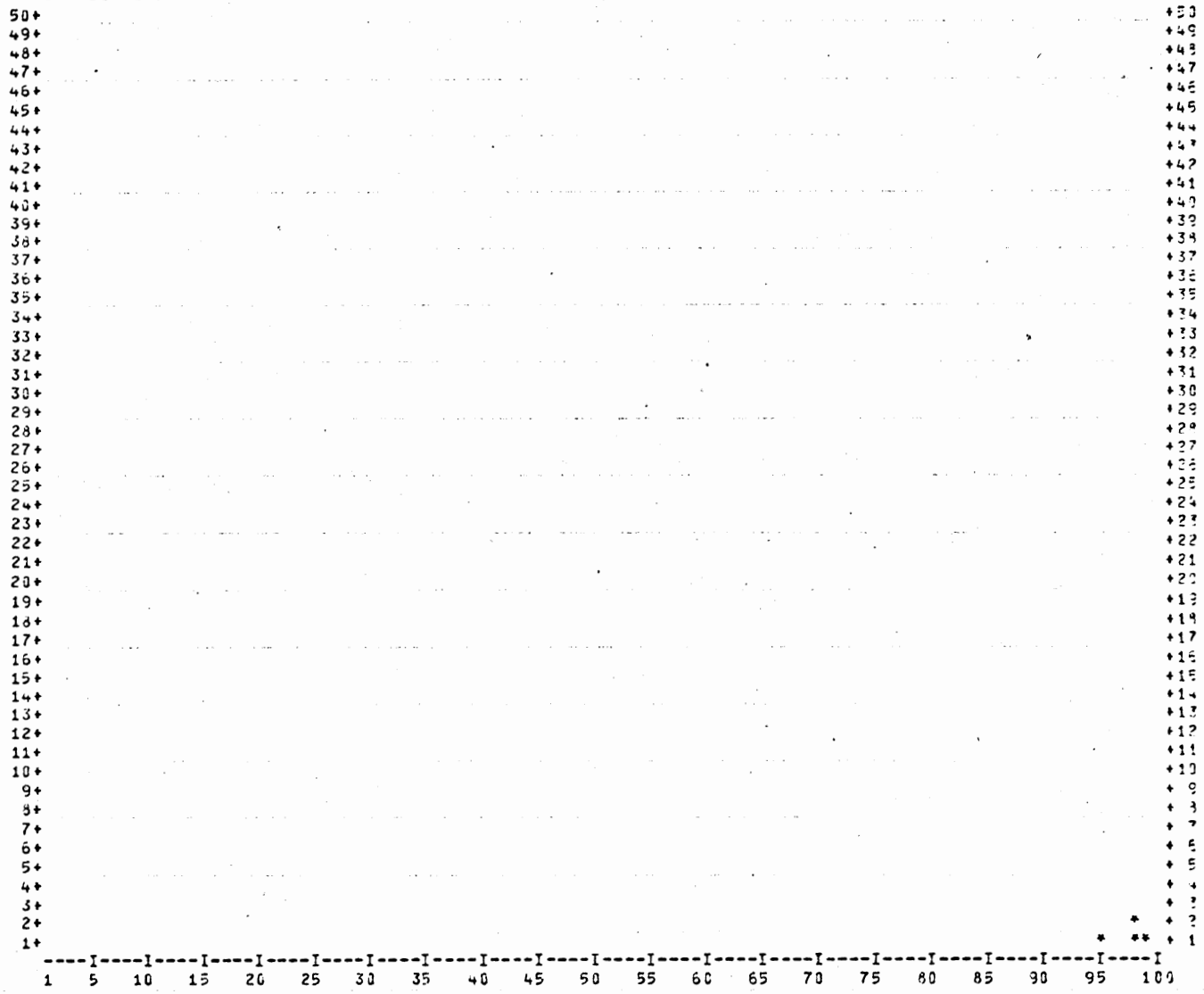


FIGURE 40. Length frequencies of giant sea bass for October 1977.

LENGTH HISTOGRAM FOR GIANT SEA BASS (STEREOLEPIS GIGAS)
DURING NOVEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

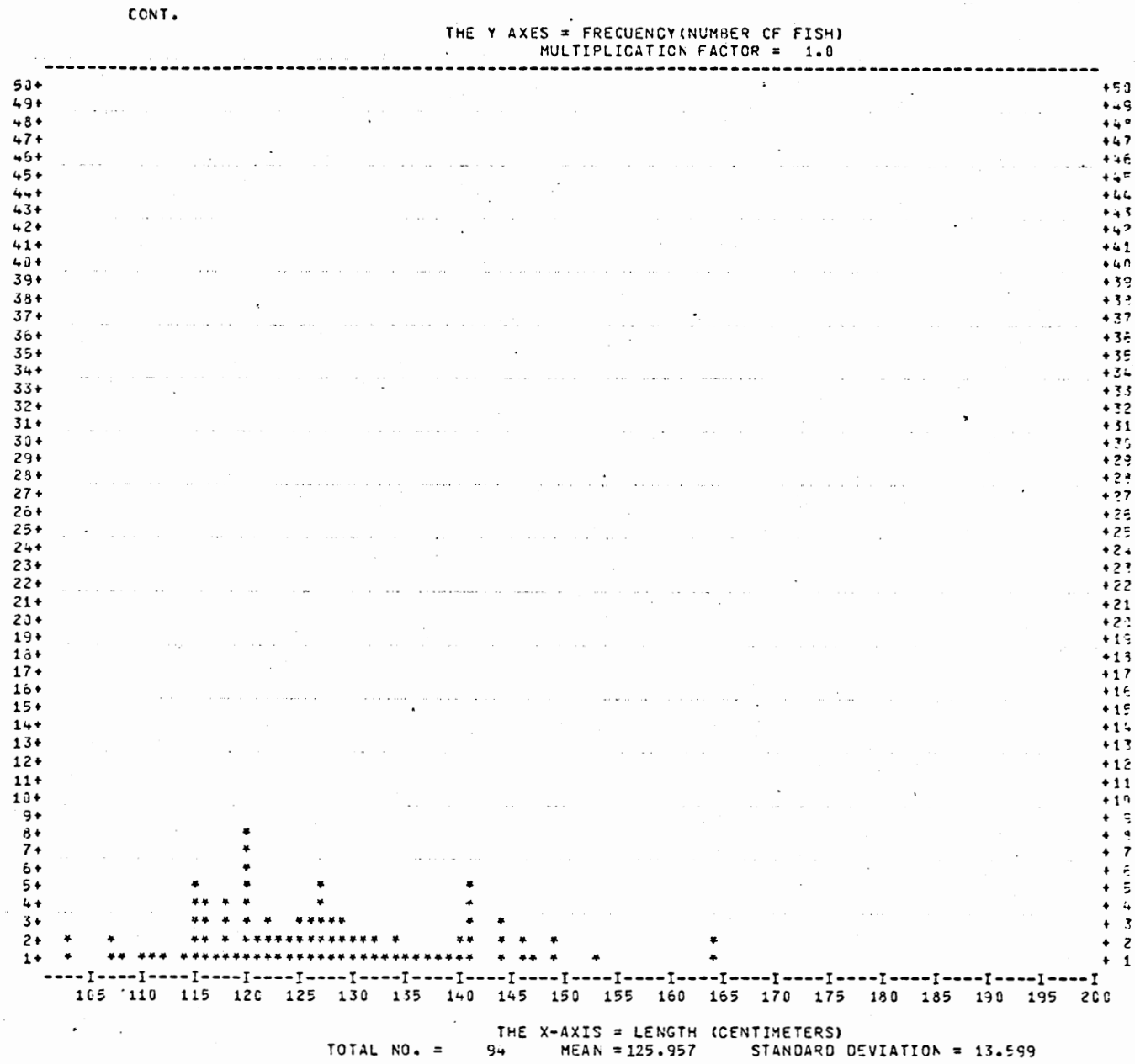
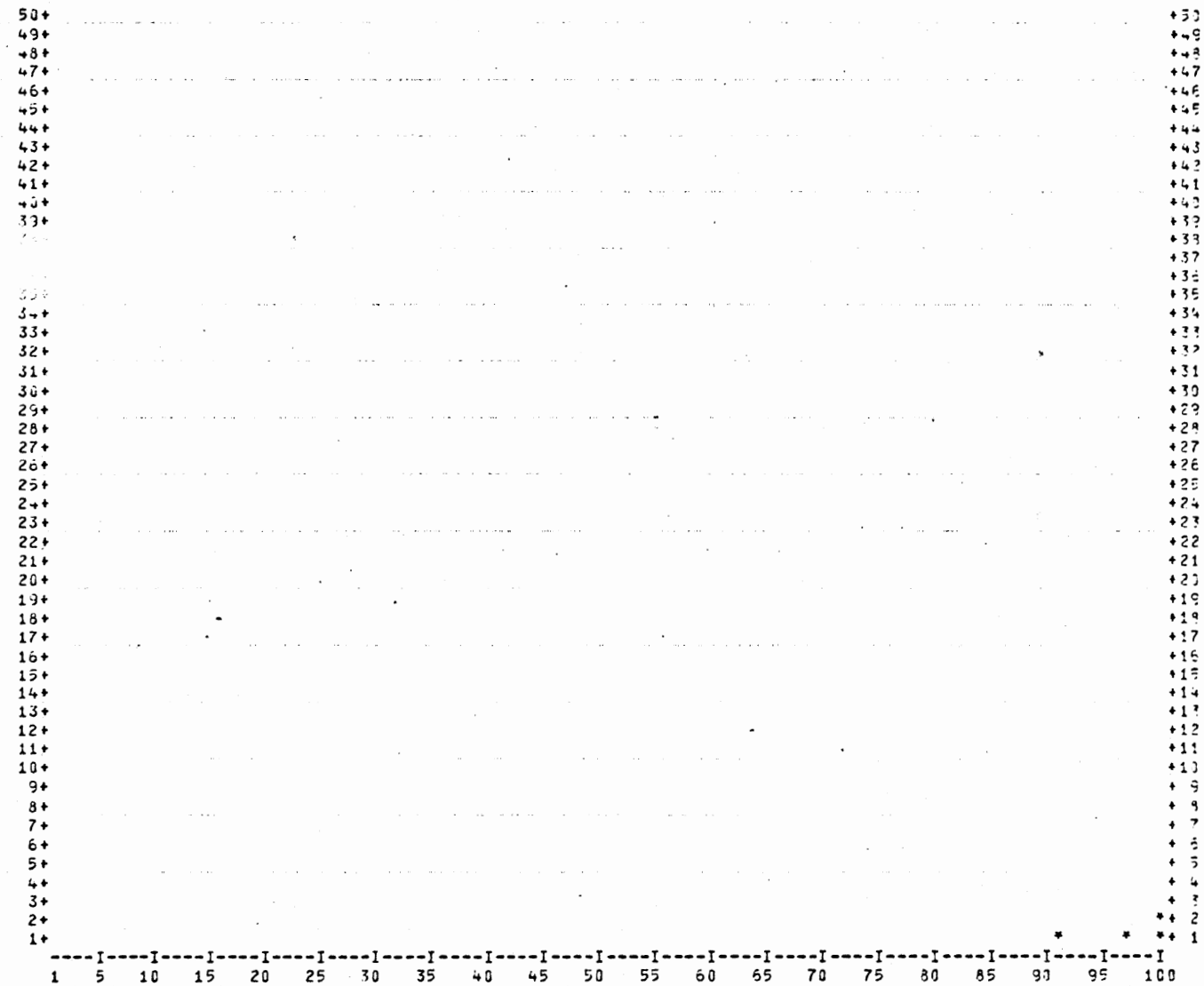


FIGURE 41. Length frequencies of giant sea bass for November 1977.

LENGTH HISTOGRAM FOR GIANT SEA BASS (STEREOLEPIS GIGAS)
DURING DECEMBER 1977.

THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1.0



THE X-AXIS = LENGTH (CENTIMETERS)

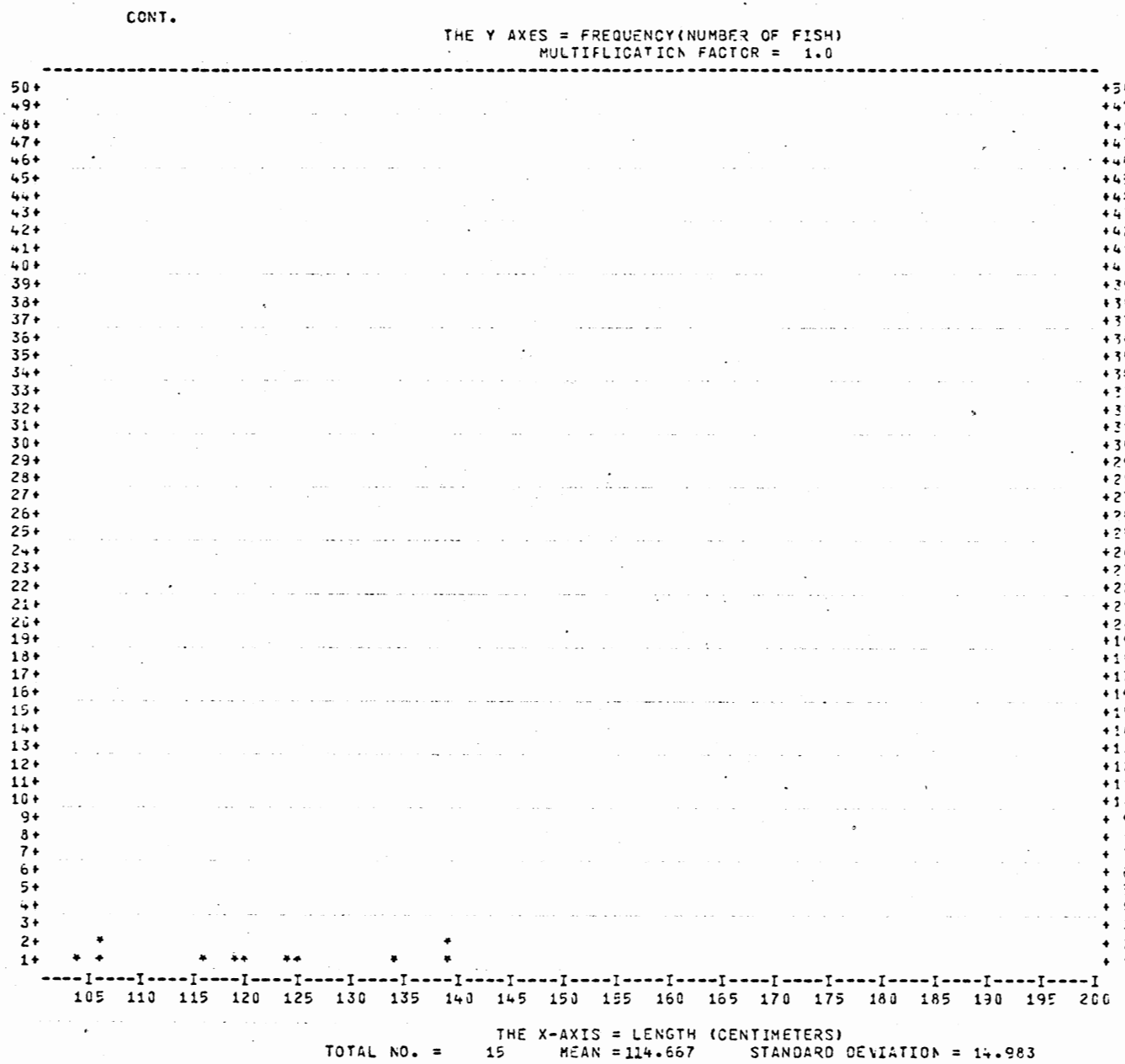


FIGURE 42. Length frequencies of giant sea bass for December 1977.
Total No. Quarter 135 Mean Length Quarter 124.977 cm